MOTOROLA

FREQUENCY COUNTER/DEVIATION METER

S-1343A/S-1344A

6881069A27

MOTOROLA

FREQUENCY COUNTER/DEVIATION METER

S-1343A/S-1344A

MOTOROLA INC.
Communications Division Parts Dept.
10 W. North Ave., Lombard, Ill. 60148

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Arrangements for repair or replacement will be made and you will be advised of the disposition of the instrument.

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CHAPTER 1
GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains the specifications, operating instructions, theory of operation, and maintenance instructions for the Model SLN6407A and Model SLN6408A frequency modulated signal analysis system.

The system consists of the Model SLN6407A Frequency Counter with the Model SLN6408A Auto-tune Deviation Meter. The carrier frequency, deviation frequency, and deviation magnitude of a frequency modulated signal can be accurately measured using this system. In addition, an audio output is provided. A scope output allows observation of the deviation waveform. A manually set deviation limit provides a visual indication when the limit is exceeded. Deviation readout is selectable in 2, 6, 20, and 100 kHz ranges.

The Model SLN6407A may be used separately as a 20 Hz to 512 MHz frequency counter. An eight-digit readout is standard and includes a leading zero suppression feature for error free readings. A level meter, coupled to the RF input, provides a visual display of proper signal level to the operator. If an overload is connected to the input, a flashing overload indication is provided and the instrument is held in reset. Electrical protection for the RF input circuitry is provided by a diode bridge limiter. Available options include internal or external battery operation and a choice of high stability oscillators.

Light weight, portability, and ease of operation combine to make this unique system a valuable addition for laboratory or field use.

1.2 MANUAL APPLICABILITY

This manual is applicable to all model combinations of the Counter/Deviation Meter. The deviation Meter remains Model SLN6408A while the counter model numbers change dependent upon the alternate time base oscillator and power system installed. Models are available with line power only, line power and external 12V battery operation, or line power and internal battery operation. Model identification is contained in Table 1.1.

TABLE 1.1 COUNTER MODEL IDENTIFICATION

Model No.	Description
SLN6407A	Temperature compensated crystal oscillator.
SLN6418A	Standard oscillator.
SLN6419A	High stability oscillator
SLN6420A	High stability oscillator with external battery operation.

TABLE 1.1 COUNTER MODEL IDENTIFICATION (CONTD)

Model No.	Description
SLN6421A	Battery operation with internally installed batteries.
SLN6422A	External battery operation.

1.3 SPECIFICATIONS

The specifications for the frequency modulated signal analysis system are listed in Table 1.2.

TABLE 1.2 SPECIFICATIONS

Frequency Counter Specifications	
FREQUENCY MEASUREMENT	
DIRECT	
Range:	20 Hz to 50 MHz.
Resolution:	Selectable 1 Hz or 10 Hz.
Display:	MHz with autopositioned decimal point. Holds reading samples.
Accuracy:	±1 count ±time base accuracy.
Sensitivity:	25 mV rms.
PRESCALE	
Range:	25 MHz to 512 MHz.
Resolution:	Selectable 1 Hz or 10 Hz.
Display:	MHz with autopositioned decimal point. Holds reading between samples.
Accuracy:	±1 count ±time base accuracy.
Prescale Ratio:	10:1
Sensitivity:	50 mV rms.
TONE RANGE	
Range:	50 Hz to 3 kHz.
Resolution:	Selectable, 0.01 Hz/0.1 second or 0.001 Hz/second.
Display:	Hz with autopositioned decimal point. Holds reading between samples.

TABLE 1.2 SPECIFICATIONS (CONTD)

TONE RANGE (contd)	
Accuracy:	±4 counts ±time base accuracy at one second.
INPUT CHARACTERISTICS	
20 Hz to 50 MHz Input:	
Impedance:	1 MΩ shunted by 25 pF.
Coupling:	AC coupled.
Attenuation:	Variable sensitivity control.
Maximum Input:	Without Damage: 500V peak (dc plus ac component) 250 Vrms, 20 Hz to 10 kHz. 50 Vrms, 10 kHz. 10 Vrms, 2 MHz to 50 MHz.
25 MHz to 512 MHz Input:	
Impedance:	50 Ω nominal.
Coupling:	AC coupling.
Maximum Input:	Usable input +27 dBm. Maximum continuous input without damage, +33 dBm. Overload indicator flashes and instrument is held in a reset condition for inputs in excess of +27 dBm.
STANDARD TIME BASE	
Aging Rate:	±3 parts in 10^7 per month.
Temperature Stability:	±5 parts in 10^6 for 0 to 50°C; typical ±2 parts in 10^6 from 20 to 40°C.
Line Voltage:	<±1 X 10^7 for a 10% line variation.
External Input:	1 MHz, 1 Vrms into 500 Ω.
1 MHz Output:	TTL level (with INT/EXT switch in INT).
TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR	
Aging Rate:	<±3 parts in 10^7/month.
Temperature Stability:	±1 part in 10^6 from 0 to 50°C.
Line Voltage:	<±1 part in 10^7 for 10% line variation.
External Input:	1 MHz at 1 volt rms into 1 kΩ.
HIGH STABILITY OSCILLATOR	
Frequency:	3 MHz.
Aging rate after warm-up:	±1 part in 10^9 per day.

TABLE 1.2 SPECIFICATIONS (CONTD)

HIGH STABILITY OSCILLATOR (contd)	
Maximum warm-up for "OFF" periods to 1 week:	72 hours.
Frequency retrace for "OFF" periods to 24 hours:	1 hour to reach $\pm 6 \times 10^{8}$ maximum.
Short term aging rate:	1×10^{10} rms, 1 second.
Voltage stability:	28V ±2V; $\pm 5 \times 10^{10}$ maximum.
Temperature stability:	<±2 parts in 10^{10}/C° typical.
Auto-Tune Deviation Meter Specifications	
DEVIATION METER	
Frequency Range:	25 MHz to 512 MHz.
Sensitivity:	50 mV rms.
Residual FM:	Less than 150 Hz at 512 MHz.
Deviation Ranges:	2, 6, 20, and 100 kHz peak full scale. Selectable positive or negative.
Deviation Accuracy:	±3% of full scale.
Over Deviation Indicator:	Adjustable visual indication of excessive deviation.
Frequency Response:	Modulation frequency response is flat from 50 Hz to 8 kHz on 6, 20, and 100 kHz ranges. 50 Hz to 3 kHz on 2 kHz range.
Internal Speaker:	Level of de-emphasized audio output may be adjusted with audio level control.
Scope Output:	Provides linear audio ouptut into a 10 kΩ load.
Count Tone:	Indicates frequency of the tone, from the discriminator ouptut to the counter, for high resolution tone measurements. Deviation must be greater than 25% of full scale range. Resolution 0.001 Hz.
GENERAL SYSTEM INFORMATION	
Dimensions:	17.78 X 21.26 X 31.75 Cm (7" H X 8-3/8" W X 12-1/2" D).
Weight:	8.05 kg net; 10.32 kg shipping. (16 lbs net; 21 lbs shipping).
Power:	115 or 230 Vac, selèctable on rear panel. 50 to 440 Hz, 22W. 11 to 13.5 Vdc.

TABLE 1.2 SPECIFICATIONS (CONTD)

GENERAL SYSTEM INFORMATION (contd)	
Fuse:	0.5A, 115 Vac; 0.125A, 230 Vac; 4A dc.
Operating Temperature:	0 to 50°C.

1.4 AGING RATE

Aging rate defines the average slope of the fractional frequency change of an oscillator plotted against time, (Figure 1.1). Long-term aging rate is expressed as the fractional change per day, week, or month. Short term stability is expressed as the average fractional frequency change per second in a 120-second period.

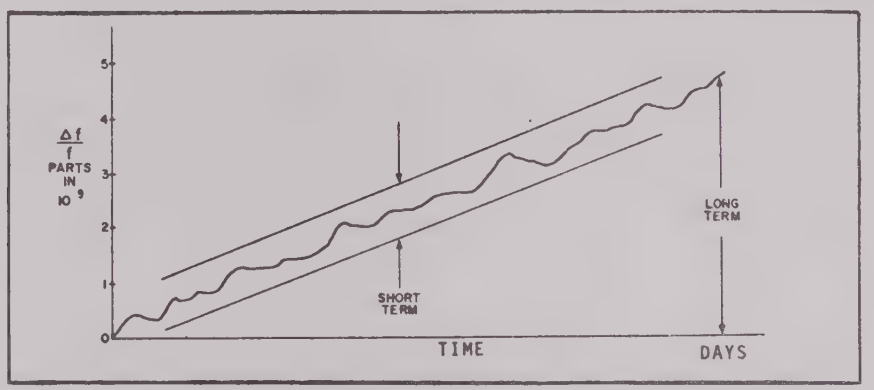


FIGURE 1.1 AGING RATE OF OSCILLATOR

1.5 LOGIC SYMBOLS AND NOTATIONS

Since most of the integrated circuit modules used in this instrument are DTL/TTL compatable, most signal levels are 0.0V to 0.8V LOW (L) and +2.4V to 5.0V HIGH (H) (see Figure 1.3). Symbols used conform to MIL STD 806B.

Integrated circuits using MECL levels are usually varied from -1.7 Vdc low to -0.9 Vdc high. The tri-state logic elements used as turn-on, turn-off gates will pass either a low signal or high signal without inversion when the gate is turned on.

The active state of logic line is identified with the absence or inclusion of bar notation over the signal name. For example: RESET: Indicates a high-level condition producing the active state of reset. $\overline{\text{RESET}}$: Indicates a low-level condition producing the active state of reset. In general, an open line to a logic symbol is considered a HIGH.

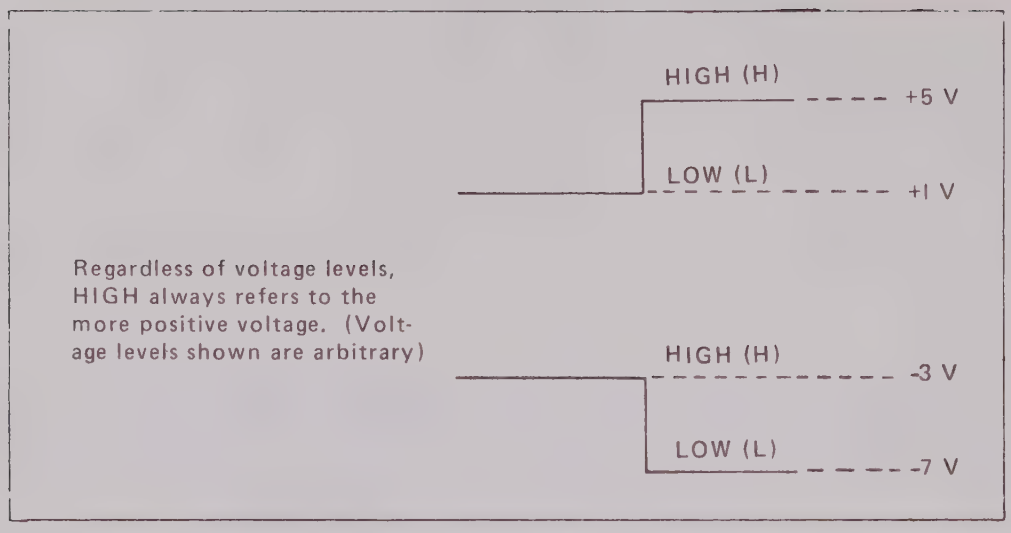


FIGURE 1.2 DEFINITION OF LOGIC LEVELS

CHAPTER 2
INSTALLATION

2.1 INTRODUCTION

This chapter contains procedures for inspection and initial installation of the Model SLN6407A/SLN6408A Frequency Counter/Deviation Meter. Instructions for reshipment have been included should it become necessary to return the instrument to the factory for service or repair.

2.2 RECEIVING INSPECTION

Prior to accepting the instrument from the shipper, inspect the condition of the shipping container for any indication of freight damage. Any sign of such damage must be noted by both the shipper and receiver; and should be reported to the insurance investigator.

Immediately following removal of the instrument from the shipping container, inspect for any possible physical damage incurred during shipment. Check surfaces for scratches or dents, broken or cracked knobs, and damaged connectors. Should any damage be found, notify your Motorola representative - - - DO NOT USE THE INSTRUMENT UNTIL INSTRUCTED TO DO SO BY THE REPRESENTATIVE.

2.3 RESHIPMENT

When the instrument is to be packaged for shipment, contact the nearest Motorola field office for shipping instructions. Use the original packaging materials or package the instrument following the general packing instructions.

GENERAL PACKING INSTRUCTIONS

1) Attach a tag to the unit indicating the model number, serial number, name and address of the instrument owner and a summary of the service or repairs required.

2) Wrap the instrument in heavy paper or plastic prior to placing it into the shipping container.

3) Select a strong carton or wooden box to house the instrument.

4) Use an adequate layer of shock-absorbing material on all sides of the instrument and protect the front panel with additional layers of cardboard. Be certain that there is no movement of the unit within the container.

5) Seal the package with strong tape or metal bands.

6) Mark the shipping container "FRAGILE-DELICATE INSTRUMENT" to ensure careful handling.

7) Be certain that all correspondence refers to full instrument nomenclature (model and serial number).

2.4 POWER REQUIREMENTS

The instrument is supplied with a standard three-conductor power cord which, when plugged into an appropriate power receptacle, grounds the chassis to protect operating personnel from certain electrical hazards. When the power cord is mated to a two-conductor outlet, an adapter plug, properly installed, will provide the same protection.

Power requirements are 115 or 230 Vac, 50 to 440 Hz, or 11 to 13.5 Vdc, and approximately 22W of power. Selection of line voltage is made by a switch on the rear panel. Fuse requirements are 0.5 amperes for 115V, 0.25 amperes for 230V operation, and 4A for dc operation.

2.5 INITIAL CIRCUIT CHECK

Prior to connecting the instrument to the line voltage, ensure that the voltage selection switch is in the proper position and the correct fuse is installed. A system operation check is contained in Chapter 5, paragraph 5.5. If at any time the instrument does not meet or exceed the specifications listed in Table 1.1, check the oscillator frequency before performing corrective maintenance. See Chapter 5, paragraph 5.3 for cover removal.

2.6 INSTALLATION OF OPTIONAL MODEL COMBINATIONS

The installation instructions are included on the Installation and Shipping Assembly Drawings located in Chapter seven of this manual. Table 2.1 lists the different model combinations with the drawing title and page number, that provides the required installation information. Replaceable Parts Lists of the Installation and Shipping Assemblies are included in chapter six of this manual.

TABLE 2.1 OPTIONAL MODEL COMBINATIONS INSTALLATION DATA

Model No.	Drawing Title	Page No.
SLN6407A-06 & SLN6418A-06	Installation and Shipping Assembly Drawing, 6V Battery Pack, Option 06, #055459	7-28
SLN6408A	Installation and Shipping Assembly Drawing, Deviation Meter, #055254	7-24
SLN6419A-05 & SLN6420A	Installation and Shipping Assembly Drawing, External DC Supply, Option 05, #055487	7-29
SLN6422A	Installation and Shipping Assembly Drawing, External DC Supply, Option 07, #055475	7-30

CHAPTER 3
OPERATION

3.1 INTRODUCTION

This chapter contains a description of the front and rear panel controls, connectors, and indicators. Information covering factors which effect measurement accuracy and step-by-step operating procedure for each of the operating modes is included.

3.2 FRONT PANEL FUNCTIONS

Table 3.1 describes the controls, connectors, and indicators located on the front panel of the instrument. Refer to Figure 3.1 for index number location.

TABLE 3.1 FRONT PANEL FUNCTIONS

Index	Name	Description
1	Range - kHz	Interlocked pushbutton switches select the FM range, in kHz, to be measured.
2	Deviation	Meter shows percentage of deviation of range selected.
3	Lock	LED indicator lights when the harmonic generator is locked to the input signal.
4	25-512 MHz 50 Ω	BNC connector accepts signals between 25 MHz and 512 MHz when 25 MHz - 512 MHz frequency band is selected.
5	Reset	Momentary pushbutton switch, when depressed will set all indicators and control functions to the zero state. When the switch is released, a new sample will commence.
6	Frequency Band 50 Hz - 3 kHz	Selects the 20 Hz - 50 MHz input BNC connector. Provides a X1000 multiplication for signals between 50 Hz and 3 kHz. Resolution switch .01 Hz or .001 Hz may be selected.
	20 Hz - 50 MHz	Selects the 20 Hz - 50 MHz input BNC connector. Provides a direct count of input signals between 20 Hz and 50 MHz. 1 Hz or 10 Hz resolution may be selected.

TABLE 3.1 FRONT PANEL FUNCTION (CONTD)

Index	Name	Description
	25 MHz - 512 MHz	Selects the 25 MHz - 512 MHz input BNC connector. Provides a prescaled count of input frequencies between 25 MHz and 512 MHz. 1 Hz or 10 Hz resolution may be selected.
7	Input Level	This meter provides a relative input level indication of the 25 - 512 MHz frequency band. Input amplitude is within acceptable limits when the meter reads in the green portion of the dial.
8	Display/Overload	LED indicator, when flashing, shows that a signal amplitude exceeding +27 dBm has been applied to the 25 - 512 MHz input connector.
9	Display/MHz	LED indicator, when lit, shows the measurement to be in MHz as read from the decimal point. Will light when either the 20 Hz - 50 MHz or 25 MHz - 512 MHz range is selected.
10	Display/Hz	LED indicator, when lit, shows the measurement to be in Hz when read from the decimal point.
11	Display/Digits	These eight-digit, seven-segment, display tubes, indicate the measurement data with decimal point.
12	Display/Off Scale	LED indicator lights when the display exceeds 9999999.9.
13	Display/Gate	LED indicator flashes showing the opening and closing of the count gate.
14	Sensitivity	Rotary knob, controlling a potentiometer, provides a variable attenuation to signals applied to the 20 Hz - 50 MHz input connector. Maximum attenuation is attained in the full counterclockwise direction.
15	Resolution 10 Hz	Interlocked pushbutton switch selects 10 Hz resolution when either the 20 Hz - 50 MHz or the 25 MHz - 512 MHz frequency band is selected. Selects .01 Hz resolution when the 50 Hz - 3 kHz frequency band is selected.

TABLE 3.1 FRONT PANEL FUNCTIONS (CONTD)

Index	Name	Description
	Resolution (contd)	
	1 Hz	Interlocked pushbutton switch selects 1 Hz resolution when the 20 Hz - 50 MHz or the 25 MHz - 512 MHz frequency band is selected. Selects .001 Hz resolution when the 50 Hz - 3 kHz frequency band is selected.
16	Power	Push-on push-off switch applied power to the instrument in either ac or battery operation. Charges the internal batteries when the instrument is connected to ac and internal batteries are installed.
17	20 Hz - 50 MHz 1MΩ	BNC connector accepts signals between 20 Hz and 50 MHz when any frequency band except 25 MHz - 512 MHz is selected.
18	Peak FM Deviation	LED indicator lights when the preset deviation limit is exceeded.
19	Limit Set	A screwdriver adjustable potentiometer sets the maximum FM deviation desired by the operator.
20	+ Switch -	Toggle switch selects either positive or negative FM deviation.
21	Scope Out	BNC connector provides output for visual observation of the tone frequency waveform on an oscilloscope.
22	Count Tone	Spring-return toggle switch connects the tone frequency to the frequency counter while held in position.
23	Audio Level	Knob, controlling a potentiometer, adjusts the audio output level of the deviation meter.

3.3 REAR PANEL FUNCTION

The Controls and Connectors mounted on the rear panel of the instrument are described in Table 3.2. Refer to Figure 3.2 for index number location.

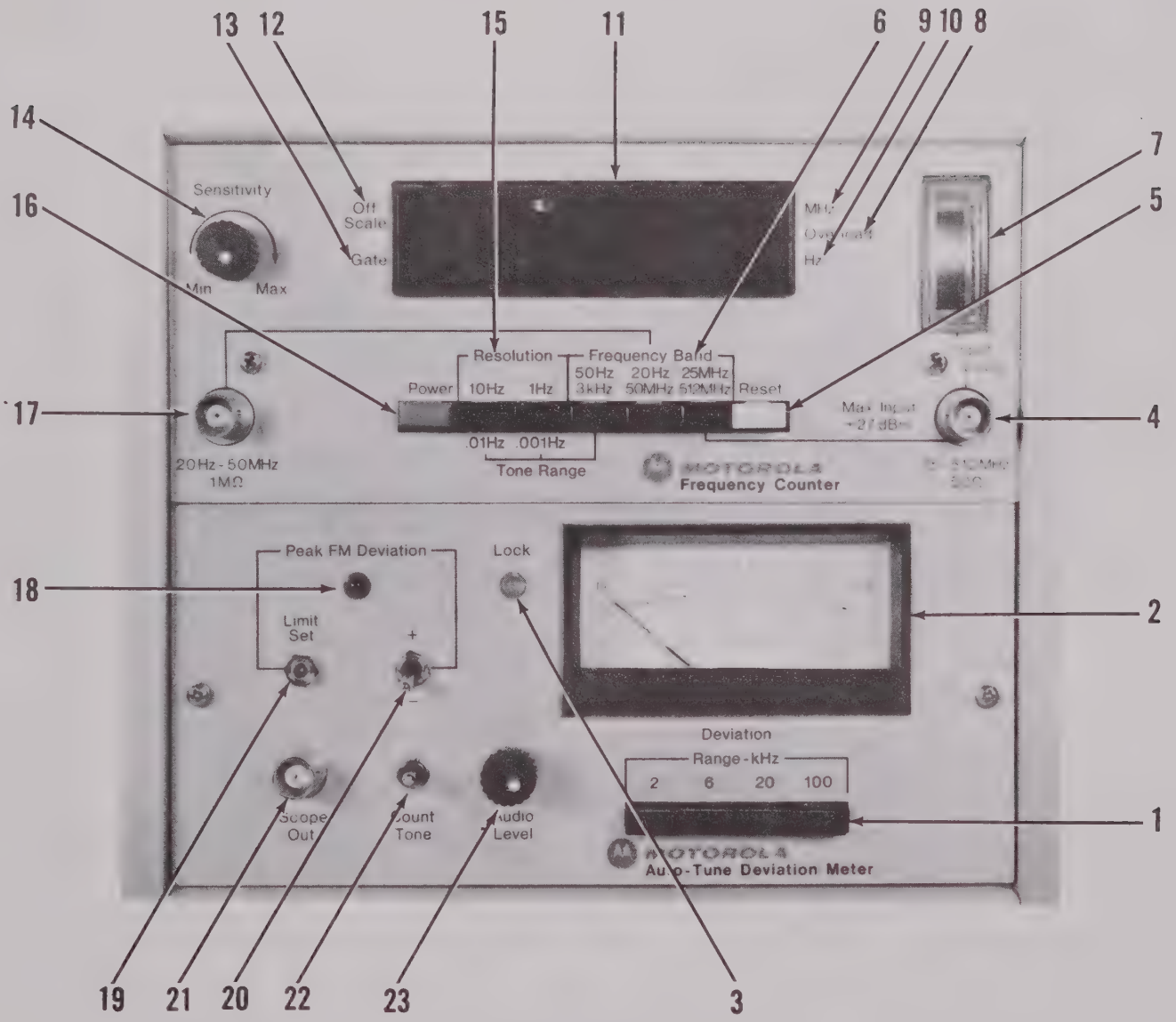


FIGURE 3.1 FRONT PANEL FUNCTIONS

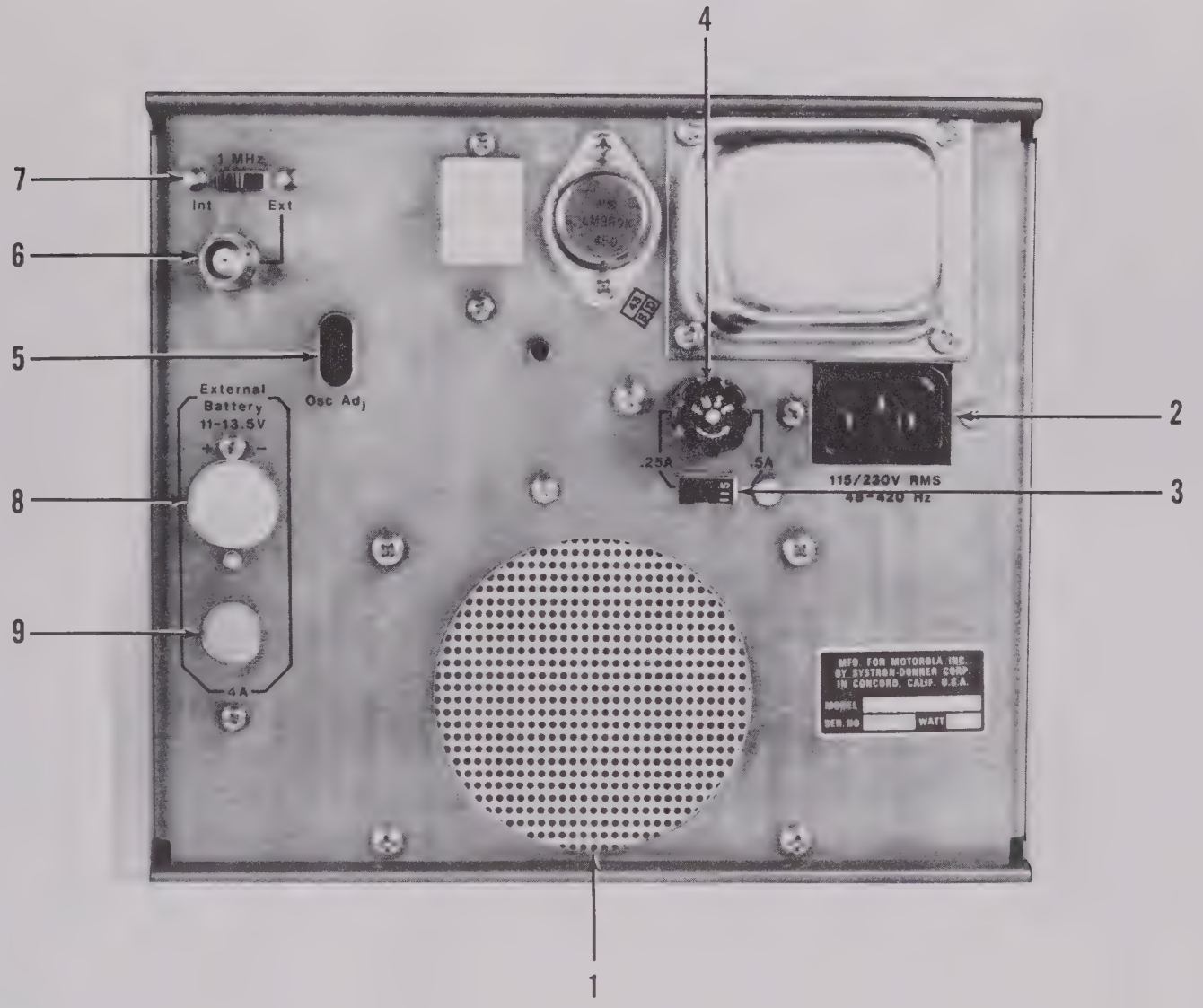


FIGURE 3.2 REAR PANEL FUNCTIONS

TABLE 3.2 REAR PANEL FUNCTIONS

Index	Name	Description
1	Speaker Cover	Cover for the instrument speaker.
2	AC receptacle	Connector socket allows connection of ac power to operate the instrument.
3	115-230	Slide switch provides for selection of 115V or 230V ac power input.
4	Fuseholder	AC power fuse, 0.5A, 115V or 0.25A, 230V.
5	Osc Adj	Provides access for adjusting the internal oscillator.
6	1 MHz	BNC connector provides input for operation with an external 1 MHz time base, or TTL 1 MHz out with INT/EXT switch in INT.
7	Int - Ext	Slide switch selects either internal time base or a time base from an external source.
8	External Battery	DC connection for operation on an external battery.
9	11 - 13.5V 4A	Fuse holder for external battery fuse.

3.4 ACCURACY OF MEASUREMENT

Two factors which may cause measurement errors in the counter are oscillator stability and gating error. Methods of minimizing these errors are contained in the discussions below.

3.4.1 Oscillator Stability

The gating precision, and, therefore, the accuracy of the count, is dependent upon the stability of the internal oscillator.

In the standard instrument, the oscillator is initially set to within ±1 part in 10^7 of a 1 MHz frequency standard having at least an order of magnitude higher stability.

Deviation of the counter oscillator from this frequency then becomes a function of several factors; the most significant being time. Due to certain processes in the frequency determining elements of the oscillator, an "aging" rate is established that can be measured and specified for the oscillator. This aging rate is specified to be less than ±3 parts in 10^7 per month. Generally, this aging rate decreases

with time (providing the instrument remains continuously energized). The error due to oscillator instability may be estimated from:

$$\text{Max \% error} = (\pm 3/10^7 \text{ X M}) \text{ X } 100$$

where: M is the number of months since last calibrated.

Oscillator stability is also a function of line voltage and temperature. To achieve the highest accuracy of measurement, the following considerations apply:

1) Maintain the instrument plugged-in and continuously energized.
2) Maintain constant environmental conditions.
3) Monitor or regulate line voltage.
4) Calibrate instrument at intervals consistent with maximum allowable error.

3.4.2 Gating Error

All types of digital measuring instruments are subject to an irreducible ±1 count ambiguity in the least significant digit of the display. This error is possible because the signal counted is not coherent (synchronized) with the time base pulses that control the signal gate. As illustrated in Figure 3.3, the first or last cycle of the input signal may or may not, pass through the signal gate during the selected measurement interval.

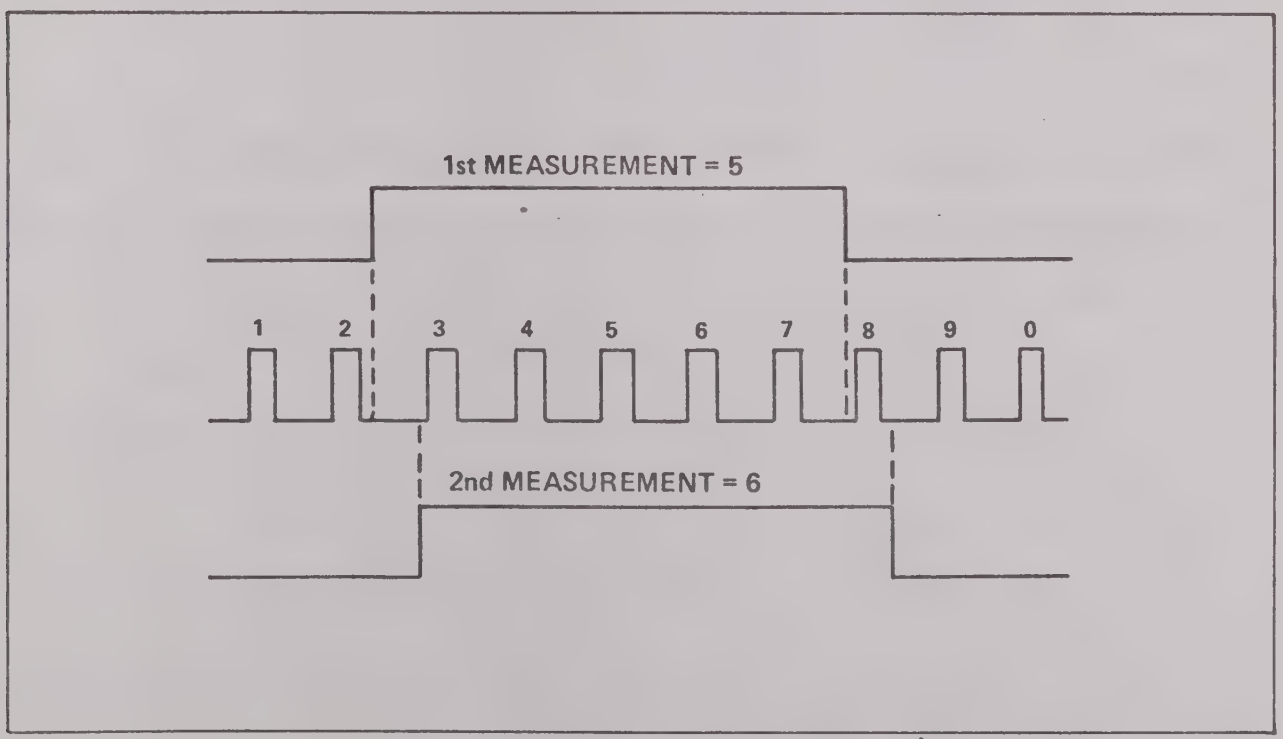


FIGURE 3.3 GATING AMBIGUITY

As measured frequency is increased, the percent of error due to the ±1 count ambiquity is reduced, since it becomes less significant compared to the total count. In any case, the maximum percentage of error is a function of the frequency measured and the number of pulses counted; i.e., the time base selected, and may be expressed by:

$$\text{Max \% error } (\leq 100\%) = \pm\frac{1}{fxT} \text{ X } 100$$

where: f is the frequency measured in Hz and T is the selected time base in seconds. Thus, to measure 1 MHz with a maximum gating error of ±0.001%, a 10 Hz resolution must be utilized.

3.5 OPERATING PROCEDURES

The instrument may be operated as an FM signal analysis system in the 25 MHz to 512 MHz range or as a frequency counter in all ranges. When in the 25 MHz to 512 MHz frequency range, the deviation meter is automatically connected and the FM deviation will be shown on the counter display. When the COUNT TONE switch is held in the closed position, the counter is switched into the tone range and will display the modulation frequency. This frequency must be at least 25% of the full scale range selected for the deviation range in kHz. Resolution will be .001 Hz.

A signal connected to the 20 Hz - 50 MHz input connector may be measured using either the 20 Hz - 50 MHz or the 50 Hz - 3 kHz frequency range dependent upon signal frequency. *Ensure that the voltage selection switch is in the proper position for the input line voltage before operating the instrument.*

3.5.1 Deviation Measurement of FM Signal

To measure the deviation of a frequency modulated signal, from 25 MHz to 512 MHz, use the following procedure.

1) Ensure the instrument is connected to the correct line voltage, or battery voltage if alternate source utilized.

2) Depress the power switch.

3) Depress the 25 MHz - 512 MHz FREQUENCY BAND switch.

4) Depress the desired RESOLUTION switch, 1 Hz or 10 Hz.

5) Set the rear panel INT/EXT switch to INT, or set the switch to EXT and connect a 1 MHz, 1 Vrms into 500 ohm, external time base to the 1 MHz BNC connector.

6) Select the desired deviation range, in kHz, 2, 6, 20, or 100.

7) If visual observation of the modulation waveform is desired, connect the SCOPE OUT BNC connector to the vertical input of the oscilloscope.

8) Connect a frequency modulated signal, 25 MHz to 512 MHz, minimum amplitude 50 mV rms, to the 25 MHz - 512 MHz BNC connector. (If an overload condition exists, the OVERLOAD indicator will flash).

9) Select the desired deviation, positive or negative.

10) The LOCK indicator on the deviation meter will light. The carrier frequency can be read directly from the counter and the deviation directly from the deviation meter.

11) The peak deviation indicator will light when the deviation percentage limit for the selected range is exceeded.

12) For measurement of a non-frequency modulated signal in the 25 MHz to 512 MHz band, use the above procedure. The frequency is read directly from the counter display, deflection of the deviation meter will indicate noise on the signal source.

3.5.2 20 Hz to 50 MHz Frequency Band

1) Ensure the instrument is connected to the correct line voltage or battery voltage if alternate source utilized.

2) Depress the power switch.

3) Depress the desired resolution switch, 1 Hz or 10 Hz.

4) Set the rear panel INT/EXT switch to INT, or set the switch to EXT and connect a 1 MHz, 1 Vrms into 500 ohm, external time base to the 1 MHz BNC connector.

5) Turn the sensitivity control fully counterclockwise.

6) Connect a signal, 20 Hz to 50 MHz, 25 mV rms minimum, to the 20 Hz - 50 MHz BNC connector.

7) Adjust the sensitivity control as required for a stable reading.

8) Read the frequency directly from the display.

3.5.3 50 Hz to 3 kHz, Tone Range

1) Follow the same procedure as for the 20 Hz to 50 MHz range except depress the 50 Hz - 3 kHz FREQUENCY BAND switch. Connect a 50 Hz - 3 kHz signal to the 20 Hz - 50 MHz BNC connector.

2) The resolution will be .001 Hz or .01 Hz as selected by the resolution switch.

CHAPTER 4
PRINCIPLES OF OPERATION

4.1 INTRODUCTION

This chapter contains a functional description of the counter/deviation meter frequency modulated signal analysis system at the block diagram level. Individual assemblies are described in sufficient detail to assist the technician in understanding and troubleshooting the system.

4.2 FUNCTIONAL DESCRIPTION

The system consists of two basic units. A 20 Hz to 512 MHz frequency counter, which can operate independently, and an auto-tuned frequency modulation receiver which drives the deviation meter circuitry. Figure 4.1 is a functional block diagram of the system and Figure 4.2 is a functional block diagram of the deviation meter.

The frequency counter consists of front panel controls, input amplifier-shaper, multiplier, function select logic, function control logic, time base, oscillator reference, decade counter, readout unit, and power supply. The frequency band switches on the front panel connect the appropriate circuit for the particular measuring function through the function select logic. The resolution switches select a time base reference signal. The combined condition of the two switches determines the proper decimal point placement and measurement unit indicator in the readout.

When an unknown signal is applied to the instrument, the input amplifier-shaper converts the signal to a rectangular waveform. This waveform is converted into counting pulses which are directed to the decade counters when the count gate is opened by the selected time base.

The serial data is converted into BCD format by the decade counters. The BCD data is then decoded into seven line outputs by the decoder driver. The decoder/driver drives the seven-segment readouts which indicate the measurement. A separate decoder/driver provides decimal point placement on the readout. Display time of the measurement, independent of gate time, is fixed at approximately 100 µs. The readout continuously displays the most recent measurement at the end of each gate time.

When a signal is connected to the 25 MHz-512 MHz input connector, the signal is automatically connected to the input of the auto-tune deviation meter through a PIN diode leveler circuit. The signal is mixed with a local oscillator to obtain a 10.7 MHz intermediate frequency. Discriminator output is used to control ramp generation which tunes the voltage controlled local oscillator. The intermediate frequency is detected and amplified to provide outputs to the lock indicator, oscilloscope, and deviation meter. The tone range can be coupled back to the counter for a direct frequency count.

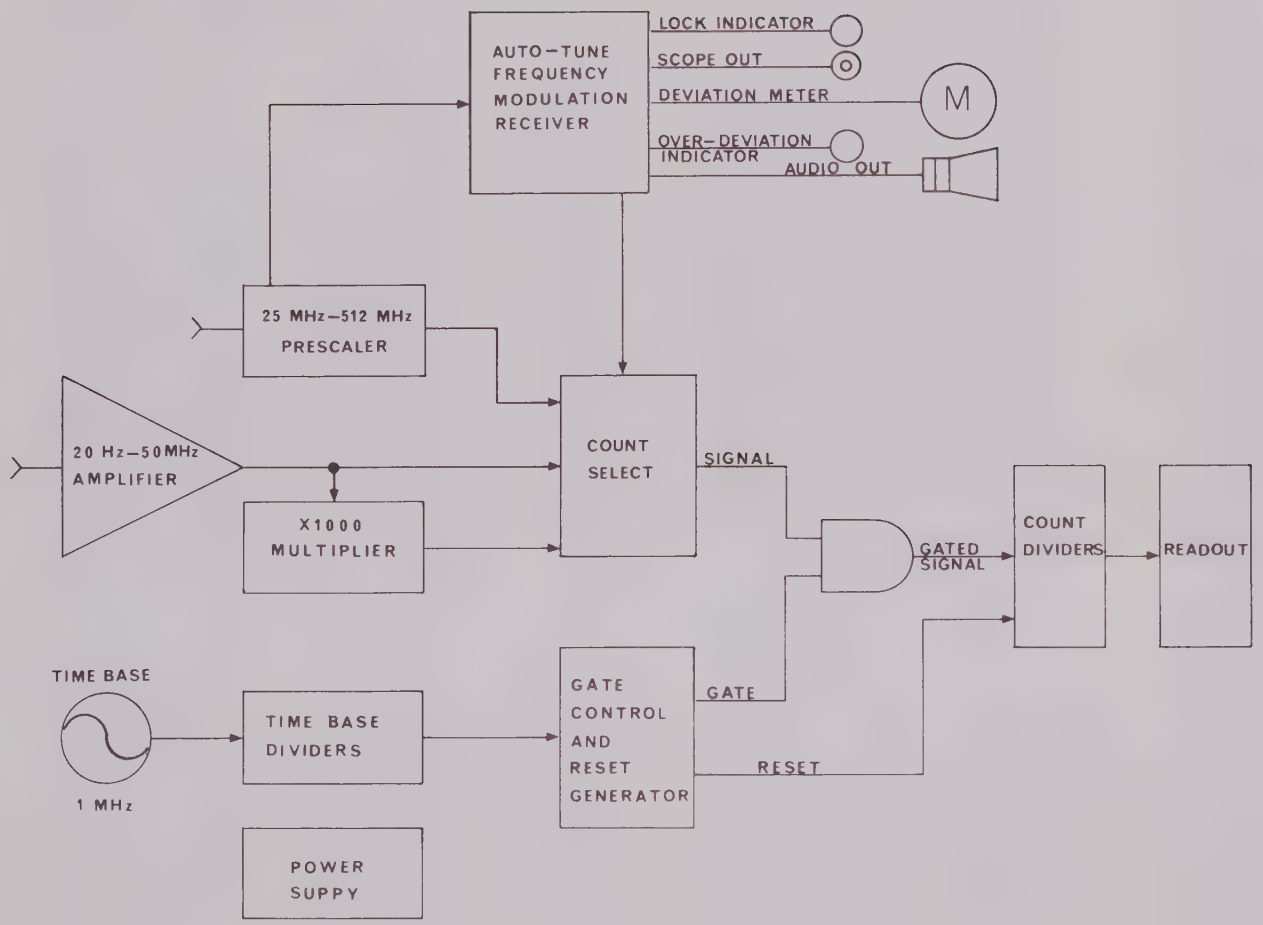


FIGURE 4.1 FUNCTIONAL BLOCK DIAGRAM

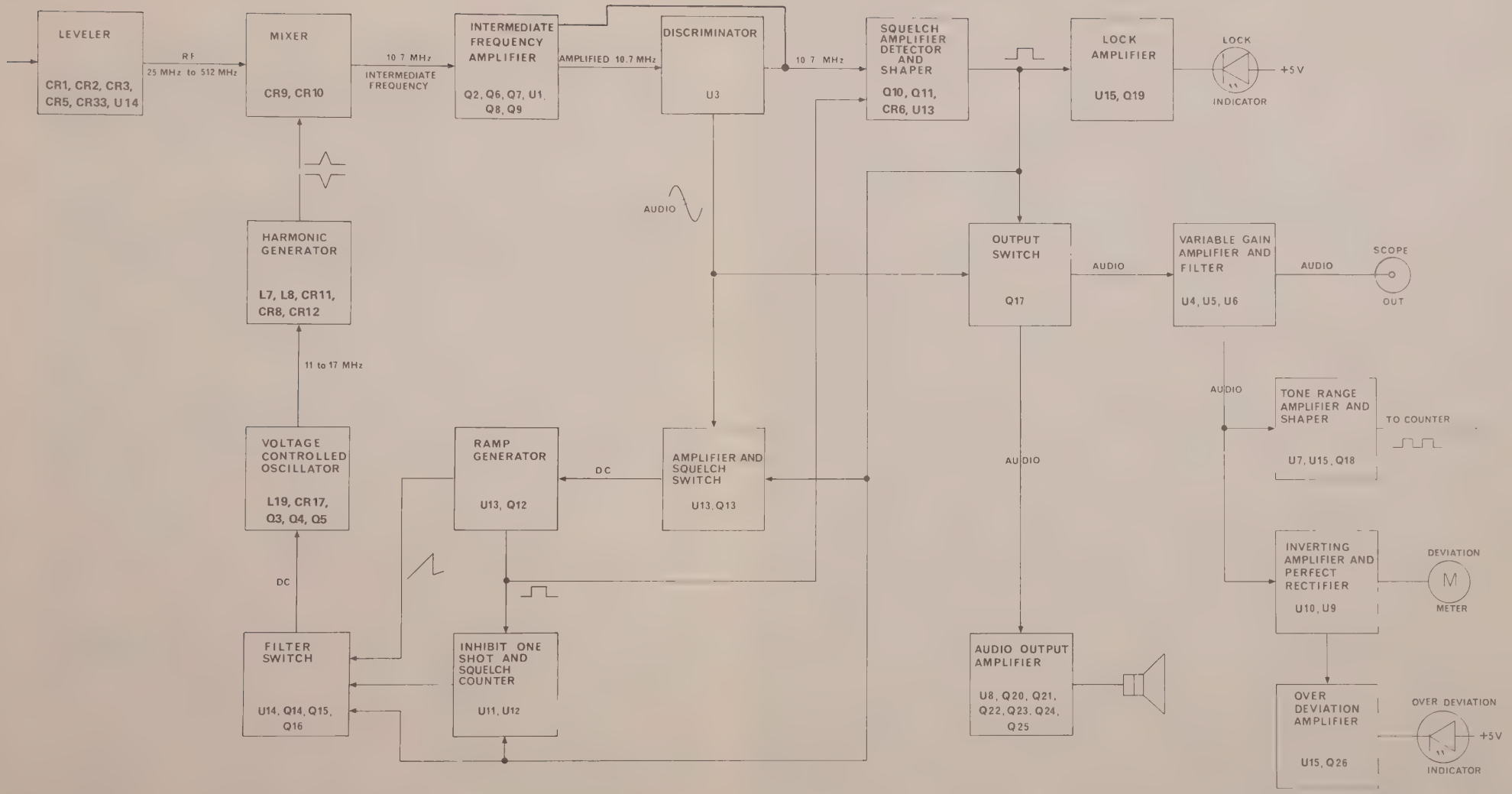


FIGURE 4.2 DEVIATION METER
SIMPLIFIED BLOCK DIAGRAM

4.3 CIRCUIT DESCRIPTION

In the following circuit descriptions, interconnect wiring references are shown in Interconnect Wiring Schematic #7-055073. Throughout the descriptions, reference designators and assembly connections are abbreviated except where clarity demands the full designator. For example, A1U7 is referred to as U7, A1 pin 27 is, referred to as A1-27.

4.3.1 Logic Assembly, A1, Schematic #7-05377001

The Logic Assembly consists of ten interdependent circuit groups; power supply, time base, control binaries count gate, control, zero suppression, decimal and legend logic, count chain, multiplex, offscale and gate light, and frequency multiplier.

The power supply consists of line filters L1, C1, L2, C2, transformer T1, and two full wave rectifiers, along with control and regulating circuitry. The dc outputs are +9V which is applied to U1 and Q3 to produce +5V, -18V which is applied to U2 for regulation to -12V, and unregulated +18V and -18V which are supplied to the deviation meter. Regulators U1 and U2 are mounted on the rear panel and left rail respectively.

Time base selection is accomplished by controlling U31, programmable divider chain containing six programmable decades. The 10 MHz frequency standard is divided by U3 to provide a 1 MHz clock frequency. The time base is selected by depressing the desired RESOLUTION and FREQUENCY BAND switches. When the internal/external switch on the rear panel is in the internal position, the 1 MHz clock frequency is available at rear panel BNC connector.

The control binaries, U32, U33 accept start-stop information from the time base divider, U31. The second section of U32 is the first binary of the count chain. This section is controlled by U35-5, while counting inputs from U22.

Recycling of the instrument is accomplished through the reset one-shot, U15, C21. The fixed recycle rate is controlled by one-shot U8, C20. The transfer one-shot, U46, C22 updates the display at each end-of-count signal.

Zero suppression is controlled by the most significant digit. At reset, the decade counters to the left of the decimal are set to "15". The first counter pulse will change the output to "1" and they will then count up through "0". As each counter is strobed, the output is sensed by U27. If the "8" and "4" are present, a blanking pulse will be developed through the decoder-driver circuit in the readout.

Decimal and legend information is selected by the resolution and frequency band switches. Decimal information is sensed by U29-6 and U24-3, which provide the required drive for the decimal point indicators. Legend information is developed by U24-8, 11, to drive the legend indicator.

The count chain consists of U32, U33, and U37 through U44. U42 is the storage element and transfer for the high speed decade U32, U33. U37 through U41 and U43, U44, are combined decade counter/storage devices which can parallel outputs for multiplexing purposes. Blanking information is developed from the "8" and "4" outputs of these devices.

Multiplex is accomplished by the free running oscillator U36, clock register U35, and decoder U34. The decoder times the sequence of multiplexing and the readout is interlaced multiplex for a proper visual indication.

Off scale is sensed by U20, U25, and U26. The circuit is designed so that U25-5 and U25-9 will assume the same state at each transfer pulse. When the most significant digit, U44, overflows, U5-5 toggles, enabling U26-11. The next transfer pulse toggles U25-9, and turns the off-scale light on.

The frequency multiplier is a phase/frequency-locked voltage controlled oscillator. U7 is a phase/frequency detector driving buffer amplifier Q6. The oscillator consists of Q7, Q9, U23-8, 6, Q10, and Q8. Output of U7-8 is a voltage which varies with the phase/frequency difference of the audio frequency input from the deviation meter and the oscillator output through the divide-by-1000 circuit, U11, U12, and U13. The resultant output, through U20-8, is a frequency 1000 times the audio frequency, phase locked to the audio frequency.

4.3.2 Readout Assembly, A2, Schematic #7-0552820]

The readout assembly consists of an eight-digit LED display, related drivers, a BCD-to-decimal decoder/driver, and a BCD-to-seven-segment decoder/driver. Each LED readout contains a decimal point indicator and seven LED's which are configured in the form of a boxed eight. The Decimal point information is decoded by BCD-to-decimal decoder/driver U2 and applied to readouts DS1 through DS7. Decoder/driver U1 decodes BCD information and provides seven lines of segment information for each readout thereby providing measurement indications. Output disable signals from the decade counters in the logic assembly sequentially gate the decoded segment information into each readout. The logic assembly also provides signals to light front panel indicator LED's CR1 through CR4.

4.3.3 Amplifier Assembly, A3, Schematic #7-0531130]

The amplifier consists of a variable attenuator, an impedance changing circuit, Q2, Q3, a gain circuit, Q4, Q5, Q6, and a shaper, U1, along with associated circuitry for each.

The effective sensitivity is varied by the sensitivity control, R1. Voltage gain is obtained in Q4, Q5, and current gain in Q6. The operating level of Q6 is varied by the trigger level control, R25, to set the Q6 output level to the input level required by Schmitt trigger, U1-8, U1-11. The outputs of U1-3 and U1-6 are used to drive the 20 Hz-50 MHz circuitry on the logic board.

4.3.4 Prescaler Assembly, A4, Schematic #7-0534990]

The prescale assembly is comprised of the prescaler circuit and the overload circuit. Input is through the 25 MHz-512 MHz BNC connector. Prior to the prescale circuit, the input signal is routed through the divider network, R1, R2, R3, to the deviation meter. It is also routed to the overload circuit.

Input to the prescale circuit is through diode limiter CR2, CR3, CR4, CR5. Q1 through Q5, with the related circuitry, is a broadband amplifier feeding the scale-of-ten circuit, U3. The amplifier is balanced through potentiometer R10. The output of U2, one-tenth the input frequency, is buffered and level converted in Q6, Q7. The output is applied to the logic board to be counted through A1U22.

The overload circuit consists of U1, U2, U4, and associated circuitry. The detected input signal is applied to one input of U1, the other input is a divider network from +5V to -12V. Meter zero level is controlled by potentiometer R11. The output of U1 drives the level meter and is applied to U2. When the input level to U2 exceeds the overload level set by potentiometer R51, Q8 conducts, turning on Q9, to drive U4. The output is applied to the logic board to light the overload indicator. The indicator will flash until the overload is removed.

4.3.5 Oscillator Assembly, A5, Schematic #7-0534990l

The 10 MHz oscillator consists of a quartz crystal controlling a Colpitts circuit. This oscillator provides the standard frequency to which all unknown frequencies are compared. The output can be calibrated to a standard by adjusting the variable capacitor, C2.

4.3.6 Automatic Deviation Analysis Meter, Schematic #7-0534410l

Input is through J1 to a PIN leveling circuit composed of CR1, CR2, CR33, CR3, CR4, CR25, U14 and associated circuitry. The output is applied to a balanced harmonic mixer, L7, L8, CR8, CR9, CR10, CR11 and CR12 and mixed with the local oscillator frequency. The mixed signal is applied to a 10.7 MHz intermediate frequency (IF) amplifier, Q2, Q6, Q8, Q9 and U1.

There are two outputs from the IF amplifier. An amplitude limited output is applied to the squelch amplifier and a TTL output to flip-flop, U2, which divides the 10.7 MHz IF by two and applies a 5.35 MHz signal to a linear discriminator. The linear, discriminator consists of two tank circuits and two diode detectors, CR13, CR14, and differential amplifier, U3. One of the tank circuits is tuned above 5.35 MHz and the other tuned below 5.35 MHz. CR13 and CR14 are slope detectors. The detected dc voltage is applied to U3, which amplifies and compares the detected voltages. The squelch amplifier output is detected by CR6 and applied through U13 to the squelch switch, Q13, filter switch, U14, Q14, and the output switch, Q17. Another output goes to the inhibit one-shot, U12, and squelch counter, U11.

The output of the linear discriminator is applied to the threshold amplifier, U13, in the lock circuit and through the output switch, Q17, to the output circuits. In the lock circuit, the output of the threshold amplifier is applied to the squelch switch. When the squelch signal is present on the Gate of Q13, the threshold amplifier signal is passed through to the ramp generator, U13. This signal will stop the ramp generator at whatever voltage output is present when the signal is received. The output of the ramp generator is the control voltage for the local oscillator.

Output of the ramp generator is applied to the local oscillator through the filter switch. Squelch must be present on the base of Q14 at that time. The filter switch, Q14, applies a long time-constant filter to the local oscillator control line

to prevent the oscillator from responding to the audio signals developed in the discriminator. The output of the local oscillator is applied to the harmonic generator. The harmonic generator output is applied to the balanced mixer and locks with the incoming signal.

Squelch applied to the squelch counter inhibits the system from locking on the wrong sideband. If the system should lock on the wrong sideband, the squelch will cycle on and off and not allow the ramp generator to drive to the proper position. The output of the squelch counter is applied to the inhibit one-shot which will inhibit squelch for a time long enough for the ramp to move the local oscillator on to the next beat. U13-1 inhibits squelch during the ramp recycle time.

In the output circuits, with squelch present at the base of Q17, the discriminator output is applied through Q17 to a variable gain amplifier, U4. Selection of the attenuation to the input of the amplifier is made by the RANGE-kHz switches on the front panel. Output of the variable gain amplifier is applied to a 4 pole, active, low-pass filter, U5, U6, with a break-point at 10 kHz. The signal from the filter drives the scope output, output to counter, meter output, and over-deviation light.

Scope output is directly off the filter output through an isolation resistor, R128. The tone range output to the counter is through amplifier shaper U7, U15-4, and Q18. Output to the meter and overdeviation circuits is through a unity gain inverting or non-inverting amplifier, U10. Inverting or non-inverting mode is selected by the (+), (-) switch on the front panel. Output of the amplifier drives a perfect rectifier circuti, U9, which drives the deviation meter. This output is also routed through the limit set potentiometer to shaper and one-shot circuit, U15-6, 10, 15, Q26, which drives the over-deviation light.

Audio output is taken directly from the output switch, Q17, and routed through the audio level potentiometer to preamplifier, U8, and amplifier, Q20, Q21, Q22, Q23, which drives the speaker.

4.3.7 OPTIONS

Three options for battery operation. Option 05 is used in the Model SLN6422A for external battery operation and when a high stability oscillator is installed. Option 06 provides for internal batteries with a battery c-harger and is installed in the Model SLN6421A. Option 07 is similar to option 05 in that both are provided for external battery operation on the Model 6422A. The only difference between the two options is option 07 does not include an oscillator inverter assembly. The inverter assemblies in each option are identical and are described once. The oscillator inverter assembly and battery charger are also described.

4.3.8 Inverter Assembly, Schematic #7-055486, 7-055462, and 7-055485

The inverter operates from battery power, external or internal, to generate +5V, and ±18V. Battery voltage is applied to pin 3 of the inverter. Transistor Q6 devlops the +5V supply which is regulated by Q4, Q5, and U2. Transistor Q1 and its associated circuitry provides +6V to inverter U1 of the battery supply voltage is 12 volts, the voltage is dropped to 6 volts. When 6-volts internal batteries are installed, the same circuits merely apply the voltage to the inverter.

4.3.9 Oscillator Inverter, Schematic #7-055486

The oscillator inverter generates +24V for the high stability oscillator supply. Battery voltage is multiplied and regulated to provide a stable output voltage.

4.3.10 Charger Assembly, Schematic #7-055462

The charger assembly is used with internally installed batteries. Batteries are charged only when the instrument is turned off and the power cord is connected to a source of ac voltage. Charging voltage is obtained from Q4 in the counter power supply and charges the batteries at approximately a one-ampere rate until maximum voltage is sensed by differential amplifier Q3-Q4. At high-voltage (approximately 6.7 volts) the charge rate is reduced to a trickle charge rate of 100 milliamperes.

CHAPTER 5
CALIBRATION AND MAINTENANCE

5.1 INTRODUCTION

This chapter contains procedures for the calibrating and maintenance of the S-1343 and S-1344 series to aid the user in maintaining the instrument in proper operating condition. Whenever the instrument requires service, contact the nearest Motorola representative to arrange field service, or factory returns if necessary. Address all inquiries on operation or application to the nearest Motorola Communications Division sales/service office listed in the front of this manual. Specify both model and serial number in all correspondence.

5.2 TEST EQUIPMENT

Test equipment recommended for maintaining and checking performance is listed in Table 5.1. Equivalent test equipment, having similar performance characteristics, may be substituted when necessary.

TABLE 5.1 TEST EQUIPMENT

Type	Characteristics	Recommended Model
Signal Generator		Motorola Model S-1329A
Signal Generator		HP Model 608
Signal Generator		HP Model 612 A
Signal Generator		HP Model 651 B
Signal Generator		Wavetek Model 2001
Digital Voltmeter		SD Model 7004A
RF Power Amplifier		EIN Model 503L
RF Voltmeter		HP Model 411 A
Oscilloscope		Tektronix Model 545
Frequency Standard	Stability <2 X 10^{11} per month	General Technology Model 304 B
Connector	BNC "T"	---

5.3 COVER REMOVAL

To remove either the top or bottom cover, remove the screws which are exposed at either side of the cover. Slide the cover to the rear and lift away from the instrument.

WARNING

Dangerous voltages are exposed when the covers are removed and the isntrument is connected to a power source. Exercise care when performing maintenance or calibration procedures.

To remove the side covers, remove the end trim at the rear of the instrument, slide the covers back and away from the instrument.

5.4 DEVIATION METER INSTALLATION

Connect the power cord to the deviation meter. Ensure the white RF cable from the counter is clear of the deviation meter and insert the deviation meter approximately three fourths the way into the chassis. Insert the RF Cable through the hole from the top of the deviation meter and connect to the meter input on the bottom of the P.C. board. Slide the deviation meter completely into the chassis. To remove the deviation meter from the chassis, reverse the above procedure.

5.5 OPERATIONAL TEST

The following procedures may be used to determine a requirement for calibration/maintenance or to check the instrument after calibration/maintenance has been performed. If the instrument does not meet or exceed the specifications listed in Chapter 1 of this manual, the need for calibration or maintenance may be indicated. Prior to performing calibration or maintenance, check the oscillator calibration, fuses, and power source.

5.5.1 Counter Functional Test

This test is applicable to all models of the counter used in the Counter/Deviation Meter.

1. Connect the instrument to the appropriate power source.
2. Set the counter controls:

1 MHz Int/Ext	Int
Resolution .001 Hz	Press
Frequency Band 50 Hz-3 kHz	Press
Sensitivity	Max
Power	Press

3. Connect signal generator, Model 651, to the 20 Hz-50 MHz input connector.
4. Adjust the signal generator for a frequency of 50 Hz, dial accuracy, and an amplitude of 25 mV rms.
5. Display should indicate 50.000 Hz ±4 counts ±dial accuracy.
6. Increase signal generator output frequency to 3 kHz. Display should read 3000.000 Hz ±4 counts ±dial accuracy.
7. Press .01 Hz Resolution. Display should be 3000.00 Hz ±4 counts ±dial accuracy.

8. Press 20 Hz-50 MHz Frequency Band switch. With signal generators, Model 651 and Model 608, apply various frequencies between and including 20 Hz and 50 MHz at an amplitude of 25 mV rms.

9. Display should indicate input frequency ±1 count ±dial frequency.

10. Press 25 MHz to 512 MHz Freqeuncy Band switch. Utilizing signal generators, Model 608 and Model 612, apply various frequencies, between and including 25 MHz to 512 MHz at an amplitude of 50 mV rms, to the 25 MHz-512 MHz input connector.

11. Display should indicate input frequency ±1 count ±dial accuracy.

12. Connect test equipment as shown in Figure 5.2. Slowly increase power amplifier output signal amplitude until overload light flashes. Reduce signal amplitude. Instrument should indicate input frequency.

13. Adjust signal generator to a frequency of 512 MHz and record reading on dispaly. Connect 1 MHz freqeuncy standard to 1 MHz connector on rear panel. Position Int/Ext switch to Ext.

14. Display should show less than 51 counts difference.

15. Press 1 Hz resolution switch, momentarily press Reset switch. Off Scale indication should light at end of gate.

5.5.2 SLN6408A Functional Test

To perform these tests, the deviation meter must be installed in a functional counter. See Section 5.4.

1. Connect the instrument to an appropriate power supply.

2. Position the instrument controls.

COUNTER	
Int/Ext (rear panel)	Int
Power	Press
25 MHz-512 MHz	Press
10 Hz	Press
Sensitivity	Max
DEVIATION METER	
Audio Level	CCW
Deviation	- (Neg)
Range-kHz	Press 2

3. With a signal generator connected to the 25-512 MHz input connector, apply various frequencies between 25 MHz and 512 MHz at an amplitude of -13 dBm.

4. Observe Lock indicator. Indicator should light within four seconds after signal is applied.

5. Connect signal generator S1329A to the 25-512 MHz input connector. Adjust to a frequency output of 512 MHz at an amplitude of -13 dBm with zero modulation deviation. Lock indicator should light and deviation should be 150 Hz or less. (NOTE: Generator FM noise should be taken into account).

6. Connect signal generator Model 651 to external modulation connector on signal generator S1329A. Adjust S1329A to 30 MHz output at an amplitude of -13 dBm.

7. Press Range-kHz switch 6.

8. Adjust modulation frequency to various frequencies between 50 Hz and 8 kHz at a modulation deviation of 1.5 kHz. Press Count tone switch and verify correct readout on counter display.

9. Adjust signal generator to 30 MHz at -13 dBm. Adjust modulation frequency to 1 kHz with 5 kHz modulation deviation.

10. Adjust Limit Set so that Peak FM Deviation indicator lights.

11. Vary modulation frequency between 50 Hz and 8 kHz and verify Peak FM Deviation indicator lights at 5 kHz ±180 Hz modulation deviation and goes off below 5 kHz.

12. Connect signal generator S1329A, power amplifier, EIN503L, and RF Voltmeter, HP411A, as shown:

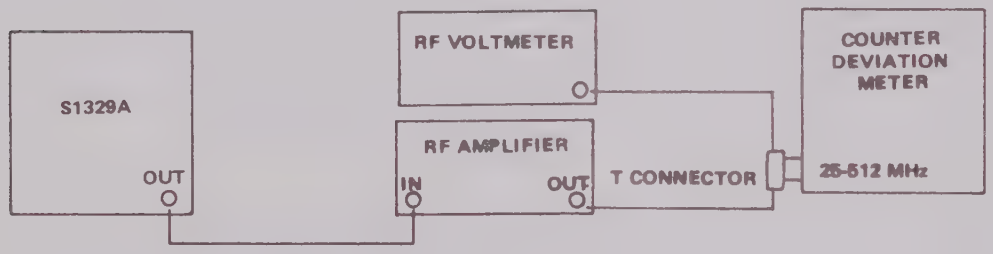


FIGURE 5.1 DEVIATION TEST CONNECTIONS

13. Press Range-kHz 6 switch.

14. For the following tests use various frequencies between 25 MHz and 512 MHz for each step. Vary the signal amplitude from -13 dBm to +27 dBm at the counter input.

15. With the signal at 5 kHz deviation, 1 MHz modulation frequency, verify Deviation Meter reading of 5 kHz ±180 Hz.

16. Change the modulation frequency to 8 kHz. Verify Deviation meter reading of 5 kHz ±180 Hz.

17. Change the modulation frequency to 50 Hz. Verify Deviation meter reading of 5 kHz ±180 Hz.

18. Change the modulation deviation to 2 kHz. Verify Deviation meter reading.

19. Press the Range-kHz 2 switch. Verify the Deviation meter is reading 2 kHz ±60 Hz.

20. Change the modulation frequency to 3 kHz. Verify the Deviation meter is reading 2 kHz ±60 Hz.

21. Press Range-kHz 20 switch. Adjust modulation deviation to 15 kHz. Verify a Deviation meter reading of 15 kHz ±600 Hz.

22. Change +/- polarity switch. Verify that the Deviation meter reading changes less than ±200 Hz.

23. Connect the oscilloscope (Tektronix 581) to the Scope Out connector on the front panel. Record the peak-to-peak voltage of the 3 kHz sine wave.

24. Press the Range-kHz 100 switch. Record the peak-to-peak voltage of the 3 kHz sine wave. Verify that it is 20% of the reading in step 23, ±3%.

25. Disconnect the signal generator, RF amplifier, and RF voltmeter.

26. Connect signal generator, Wavetek 2001, to the 25-512 MHz connector. Modulate the signal with the HP 651.

27. Utilize various frequencies from 25 MHz to 512 MHz at an amplitude of -13 dBm. Modulate the signal with a frequency of 1 kHz and a modulation deviation of 100 kHz.

28. Verify correct operation of the instrument.

29. Repeat steps 27 and 28 using a modulation frequency of 50 Hz.

30. Repeat steps 27 and 28 using a modulation frequency of 8 kHz.

31. Connect signal generator S-1329A to the 25-512 MHz input connector. Modulate the signal with HP 651.

32. Adjust the signal generator for various output frequencies from 25 MHz to 512 MHz at -13 dBm amplitude. Change modulation frequency from 300 Hz to 8 kHz at a modulation deviation of 500 Hz to 6 kHz. Verify operation of the Audio Level control and speaker.

5.6 CALIBRATION

The time base oscillator is the only assembly which requires periodic calibration. The maximum interval between calibration periods depends upon the degree of accuracy required by the user, see Section 3.4 and Table 1.1.

5.6.1 Standard Oscillator and TCXO Calibration

1. Set the instrument controls:

Resolution	1 Hz
Frequency Band	20 Hz-50 MHz

2. Connect the 1 MHz frequency standard to the 20 Hz-50 MHz input connector.

3. Adjust the Osc Adj on the rear panel for a reading of 1000000 Hz ±1 count.

5.6.2 High Stability Oscillator

1. Ensure that the instrument has been on and operating for 72 hours prior to calibration.

2. Connect the 1 MHz frequency standard to the external Sync of the oscilloscope.

3. Connect the 1 MHz BNC Connector on the rear panel to the vertical input of the oscilloscope. Set oscilloscope for 10 ns per division.

4. Adjust the oscillator, as required, to produce a stable waveform. If the waveform moves at a rate of one division per second, the frequencies are within ±1 part in 10^8 of each other. A rate of on division per 10 second period indicates that the two frequencies are within ±1 part in 10^9 of each other.

5.7 CIRCUIT ADJUSTMENT

Circuit adjustments should not be made unless a trouble has been found which definitely indicates a need for such adjustment.

5.7.1 Power Supply

There are no voltage adjustments on the power supply, however, the checks must be made in order to assure proper voltages for instrument operation.

1. Disconnect power cord from AC power.
2. Remove top cover, input amplifier assembly, and prescaler assembly.
3. With the digital voltmeter, check the ac input connector to ensure isolation from ground.
4. Check the +5V, A4 pins 9 and K to ensure isolation from ground.
5. Check the -12V, A4 pins 8 and J to ensure isolation from ground.
6. Connect the power cord to the proper line voltage and press the Power switch.
7. Check the +5V bus for +5V ±0.2 Vdc. Check the -12V bus for -12V ±0.5 Vdc.
8. Turn power off.

5.7.2 Amplifier Assembly, A3

Perform the power supply checks prior to performing calibration of the amplifier assembly.

1. Install the amplifier assembly, A3. Check the +5V and -12V for isolation from ground.
2. Press Power switch. Set the counter controls:

Sensitivity	Max
Resolution 10 Hz	Press
20 Hz-50 MHz	Press

3. With the digital voltmeter monitor TP1.
4. Adjust BIAS potentiometer, R7, for a reading of +2 Vdc ±100 mVdc.
5. Connect the 10 MHz to 480 MHz signal generator to the 20 Hz-50MHz input connector. Adjust the signal generator for a frequency of 50 MHz with an amplitude of 100 mV rms.
6. Observe a reading of 50.00000 MHz on the display.
7. Decrease the input signal amplitude and adjust the trigger level (TL) potentiometer, R25, until the best sensitivity is obtained. This should be a signal amplitude of approximately 20 mV rms.

5.7.3 Prescaler Assembly, A4.

1. Turn power off.
2. Check +5V bus and -12V bus for isolation from ground.

3. Set the counter controls:

Resolution 10 Hz	Press
25 MHz-512 MHz	Press

4. Connect the 450 MHz to 1200 MHz signal generator to the 25-512 MHz input connector.

5. Adjust the signal generator output to 512 MHz, ±dial accuracy, at an amplitude of -13 dBm.

6. Adjust the METER ZERO potentiometer, R11, so the Input Level meter pointer rests on the dividing line between the green and lower red siection of the meter

7. Connect the signal generator, HP 608, the RF power amplifier, and the RF voltmeter to the 25-512 MHz BNC connector as shown below:

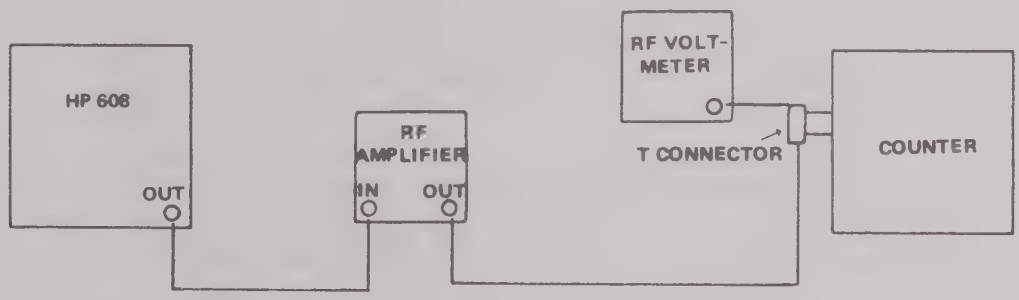


FIGURE 5.2 OVERLOAD SET TEST CONNECTIONS

8. Adjust the signal generator for a frequency output of 50 MHz. Adjust the RF amplifier for a signal amplitude of 5V rms on the RF voltmeter.

9. Adjust the OVERLOAD SET potentiometer, R51, so the Overload indicator flashes and the counter goes to the reset condition.

5.7.4 Deviation Meter, SLN6408A

1. Remove the bottom cover.

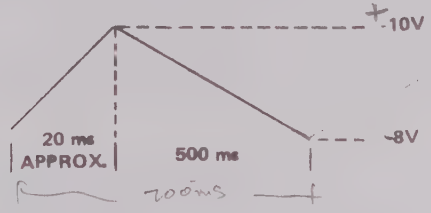
2. With the digital voltmeter, check power input terminals (lugs) 2, 3, 4, 5, and 6 for isolation from ground and isolation between terminals.

3. Press Power switch. Make the following checks:

TERMINAL	TO	RESULT
2	Gnd	+5V ±0.2 Vdc
*6	Gnd	+12.25V ±0.05 Vdc
5	Gnd	-12.25V ±0.2 Vdc
TP15	Gnd	10.5V to 11.5 Vdc
Q4 Drain	Gnd	11V to 12 Vdc

*Adjust +12V ADJ, R190, to obtain proper voltage at terminal 6.

4. With the oscilloscope, monitor TP10. Adjust R95 for a bottom ramp voltage of -8 Vdc.



5. With no signal applied, measure and record the voltage at TP1.

6. Connect signal generator, HP608, to the 25-512 MHz input connector.

7. Adjust the signal generator for an output frequency of 50 MHz at an amplitude of zero dBm. Adjust R193 so the voltage at TP1 increases 10 mV.

8. Connect the signal generator, RF amplifier, and RF voltmeter to the counter as shown in Figure 5.2. Adjust the signal generator for an output frequency of 50 MHz. Adjust the RF amplifier for an amplitude of 5V rms.

9. With the digital voltmeter monitor TP2. Adjust AGC HIGH potentiometer, R7, for the zero signal voltage at TP1 +5 mV. Change the value of R2 if required.

10. Connect a jumper from TP11 to terminal 5, -12V.

11. Install a 100 kΩ isolation resistor on the probe of the digital voltmeter and check the voltage at the source of Q4. The voltage should be 1.5V ±0.3 Vdc. If this voltage is incorrect, change Q4.

12. Adjust the signal generator for a frequency output of 15.9 MHz at an amplitude of zero dBm.

13. With the oscilloscope, monitor TP3, adjust L19 for a zero beat. (Secure core with Q-Dope.)

14. With the isolation probe, step 12, measure the voltage at the anode of CR9, adjust C54 for maximum negative voltage. The voltage measurement should be between -0.15V and 0.50V.

15. With the isolation probe, measure the voltage at the cathode of CR10. Voltage should be between +0.15V and +0.50V.

16. Install the IF shield can.

17. Adjust the signal generator for the IF center frequency (see table below) at an amplitude of zero dBm.

TABLE 5.2 FILTER COLOR CODING

Production sorting delivers five groupings of center frequencies within ±100 kHz of nominal 10.7 MHz, each with tolerance of ±25 kHz. Each is color coded for identification.					
C_f (±25 MHz)	10.625 MHz	10.6625 MHz	10.700 MHz	10.7375 MHz	10.775 MHz
Color	Orange	Yellow	Green	Blue	Violet

18. Monitor TP9, reduce signal amplitude while adjusting C15 and C42 to obtain a negative voltage peak.

19. Adjust the signal generator for the IF center frequency at zero dBm. Measure and record the voltage at TP9.

20. Remove the input signal. Measure voltage at TP16. Adjust R33 for a voltage measurement of 90% of the voltage measurement at TP9.

21. Measure the voltage at TP8. Measurement should be approximately -11V with no signal present.

22. Adjust the signal generator for the IF center frequency at zero dBm. Measure the voltage at TP8. Measurement should be approximately +11V.

23. With the signal generator, HP608, apply frequency of 9.9 MHz at an amplitude of 5 dBm to TP5, using an X1 scope probe.

24. Measure the voltage at TP7 and adjust C47 for a peak.

25. Adjust the freqeuncy to 11.5 MHz at an amplitude of 5 dBm. Measure the voltage at TP6 and adjust C52 for a peak.

26. Remove the jumper between TP11 and -12V. Place a jumepr from TP9 to ground.

27. Connect the oscilloscope external trigger to TP12, adjust for AC, -, 5 ms/div. Connect the oscilloscope vertieal input to TP13, adjust for DC, 1V/div.

28. Connect the signal generator to the 25-512 MHz input connector. Adjust for a frequency of 36 MHz at an amplitude of zero dBm. Adjust frequency until the discriminator output is seen on the oscilloscope.

29. Adjust R69 for the best symmetrical and linear output.

30. Remove jumpers between TP9 and ground.

31. Remove the input frequency. Measure and record the voltage at TP13.

32. Adjust the signal generator for an output frequency of 30 MHz at an amplitude of zero dBm. Measure the voltage at TP8 and adjust R115 until lock occurs, TP8 goes positive.

33. Measure the voltage at TP13 and adjust R115 for zero signal voltage at TP13 (recorded in 31, above).

34. Adjust R45 fully counterclockwise.

35. Connect a signal generator to the 25-512 MHz input connector and adjust to a frequency of 300 MHz at an amplitude of -16 dBm.

36. Monitor the voltage at TP8 with the digital voltmeter. Adjust R45 slowly clockwise until lock occurs, TP8 positive.

37. Check sensitivity at various frequencies between 25 MHz and 512 MHz at an amplitude of -16 dBm to -23 dBm. Re-adjust R45 if necessary.

38. Adjust signal generator to 24 MHz at 0 dBm.

39. Connect digital voltmeter to TP8.

40. Slowly increase signal generator frequency until lock occurs (TP8 positive).

41. Adjust R95 until lock occurs between 24.3 MHz and 24.7 MHz when repeating frequency change.

42. Using one signal generator for an RF signal modulated by a second signal generator at 1 kHz, apply 30 MHz signal with 1 kHz deviation to input.

43. Adjust input signal level to -12 dBm.

44. Press Range-kHz 6 pushbutton.

45. Adjust R147 until meter indicates 1 kHz.

46. Rotate Limit Set control fully ccw.

47. Rotate R126 ccw until Peak FM Deviation indicator lights, then rotate R126 cw until light goes off.

48. Connect oscilloscope to TP17 or U5-4.

49. Change deviation to 3 kHz.

50. Adjust R162 for best signal presentation while decreasing deviation. Signal should be free from extraneous signals at 1.4 kHz.

51. If necessary, adjust R156 to increase sensitivity.

52. Change to 5 kHz at 1 kHz modulation frequency.

53. Note meter reading, then change modulation frequency to 9 kHz.

54. Adjust modulation frequency between 8 kHz and 50 Hz and verify the meter reading is flat within ±120 Hz.

55. Change deviation to 15. kHz and press Range-kHz to 2 kHz.

56. Adjust modualtion freuqency from 50 Hz to 8 kHz and verify that meter reading is flat within ±40 Hz to 3 kHz and rolls off above 3 kHz.

57. Adjust C96, as necessary, to obtain indications given in step 56.

58. Apply 300 MHz signal to input. Modulate signal generator externally with 1 kHz using a second signal generator.

59. Connect oscilloscope DC input to TP9 and adjust R115 for most negative display while increasing deviation to 110 kHz.

60. Disconnect test equipment.

61. Adjust Deviaiton meter mechanical zero.

62. Calibrate signal generator for 5 kHz deviation at 1 kHz modulation frequency at any RF frequency below 175 MHz (Bessel null technique).

NOTE

Any calibrated FM signal generator accurate to within ±0.5% at 5 kHz deviation may be used.

63. Apply signal to input at -12 dBm to 0 dBm level.

64. Press Resolution-kHz 6 pushbutton and adjust R147 for a meter reading of 5 kHz.

5.8 ROUTINE MAINTENANCE

A regular program for maintenance and inspection every five to six months is recommended for this unit. As part of these regular procedures, the instrument should be checked in the following manner:

1. Disconnect ac power and remove the covers.

2. Make a thorough visual inspection of all wiring and cables. Check for frayed, loose, or burned wires.

3. Check the physical integrity of all components. Look for burned or cracked components, loose solder connections, leakage of insulation compounds, and general physical damage. When a printed-circuit board contains integrated-circuit packages, ensure that all packages are firmly mounted. Never unnecessarily remove and replace a package.

4. Check all front panel switches and controls for loose or broken terminals, loose or sticking shafts, etc.

5. If the internal panel surfaces and components have an excessive amount of dust deposited on them, use a soft brush and low-pressure stream of air to remove the foreign material.

CAUTION

Do not clean P.C. boards or small internal components with a stiff brush or solvents, since damage to the circuits may result. A high-powered vaccum cleaner device should not be used on small internal components.

6. Wipe the external surfaces of the instrument with a soft, damp cloth to remove dirt, fingerprints, and other foreign materials.

7. Replace the covers and reconnect ac power. Check instrument performance in accordance with procedures given in Section 4.4. If performance does not match or exceed the specifications listed in Chapter 1 of this manual, corrective maintenance may be required.

5.9 PRINTED-CIRCUIT BOARD REPAIR

When replacing integrated circuits or other electronic components soldered to printed circuit boards, the procedures indicated below must be followed or damage to the board may result:

1. Determine by troubleshooting techniques, which integrated circuit or discrete component(s) has failed.

2. Remove the defective component(s) from the board by cutting the pins or leads with a small diagonal clipping tool. (Always remove and replace the entire component.)

3. Apply heat (40-50 W soldering iron) sparingly to each of the cut pins or leads and remove from the board; clean the hole(s) with a toothpick or solder suction tool.

4. Form the tinned leads of the replacement part and insert in the printed-circuit holes; solder, then trim leads to extend 1/16-inch beyond the back surface of the board. (Use only 63-37 solder with maximum 1/16-inch diameter.)

CAUTION

Always trim semiconductor leads only after soldered installation is complete. This procedure greatly lessens the possibility of component failure due to shock-wave damage caused by the trimming tool.

5. When soldering semiconductor devices and all small components, be sure to use a heat sink tool or long-nosed plier connected to the component lead(s) while each is being soldered. Allow the soldered connection to cool before removing the heat sink.

6. Clean all dirt and solder-flux from the printed-circuit traces by liberal application of isopropyl alcohol or freon-type solvents.

CHAPTER 6
REPLACEABLE PARTS LIST

6.1 INTRODUCTION

This chapter contains replaceable parts lists for each of the assemblies in the Models S-1343A/S-1344A Frequency Counter/Deviation Meter.

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION FINAL ASSEMBLY S-1343/S-1344

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
7	PANEL, Decorative	64-83739K70	055687	1
9	PANEL, Sub, Blank Plug-in	64-83739K72	053690	1
10	PANEL, Blank Plug-in Decorative	64-83739K71	053691	1
12	COVER, Side	15-83739K78	053795	2
13	COVER, Bottom	15-83739K77	053794	1
14	COVER, Top	15-83739K76	053793	1
16	COVER, Front Assembly	1-83739K15	055037	1
18	WINDOW	61-83739K86	04559361	1
20	TRIM, Front	7-80311A32	03723061	2
21	TRIM, Side	7-80311A33	03985903	4
22	TRIM, End	7-80311A34	03903402	3
24	HANDLE	55-83739K87	100891	1
25	COVER, Mtg. Brkt	7-80311A35	039857	8
26	CORD, Line	30-82393K01	102407	1
27	NUT, Tinnerman 6-32	2-80311A53	100959	16
28	SCREW, 8-32 X 1/2 FHMS	3-80311A54	10074308	8
29	SCREW, 6-32 X 5/16 PHMS	3-80311A23	10063205	16
30	SCREW, 6-32 X 1/4 FHMS	3-80311A55	10073104	4
31	SCREW, 6-32 X 5/16 FHMS	3-80311A56	10073105	8
33	FEET, Set	75-83819K99	101059	1
34	BAIL, Short	42-83739K92	101057	1
35	NUT, Float 4-40	2-80311A57	102903	6
36	SCREW, 6-32 X 1/2 PHM	3-80311A19	10063208	6
38	KNOB	36-84209D33	102764	1
39	NUT, Speed 6-32 (for item 20)	2-80311A58	102944	4
41	TRIM, End Modified	7-80311A36	055035	1
42	TRIM, End Modified	7-80311A34	03903402	1
44	SCREW, 4-40 X 1/4 PHM	3-80311A60	10062604	6
45	WASHER, #4 Split	4-114583	100711	4
47	SCREW, 6-32 X 3/8 PHM	3-80311A24	10063206	2
48	SCREW, 4-40 X 7/16 PHM	3-80311A59	10062607	2
49	NUT, Kep 4-40	2-80311A16	100941	2
52	LOCTITE, 252 (for item 2)	11-84306A55	103094	A/R

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION TEST ASSEMBLY

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
A1	LOGIC P.C. Assembly	1-83739K04	D05377001	1
A2	READOUT P.C. Assembly	1-83739K05	B04558641	1
A3	AMPLIFIER P.C. Assembly	1-83739K03	B05311301	1
A4	PRESCALER P.C. Assembly	1-83739K02	B05349901	1
A5	OSCILLATOR P.C. Assembly	1-83739K01	B05318301	1
Q3	TRANSISTOR, 2N5190	48-8420D15	101394	1
Q4	TRANSISTOR, 2N5193	48-82393K14	101405	1
U2	INTEGRATED CIRCUIT, MC7912CP	51-83739K19	103156	1
	SCREW, 6-32 X 7/16	3-80311A61	10063207	4
	SCREW, 6-32 X 3/16 PHM	3-80311A62	10063203	1
	SCREW, 4-40 X 3/8 PHM	3-80311A22	10062606	1
	BRACKET, Right Angle	7-80311A40	100849	1
	NUT, 4-40 Kep	2-80311A63	100633	1
	RAIL, Bottom	7-80311A39	B053694	2
	CABLE, Tie	42-84066A60	100753	2
	WRENCH, Allen	66-80311A67	102824	1
	TINNERMAN	2-80311A64	101123	2
	NUT #6	2-7005	100638	6
	NUT #2	2-7041	100636	4
	WASHER, #2 Splitlock	4-80311A77	100661	4
	SCREW, 2-56 X 1/4 FHM	3-80311A66	10070004	4
	FASTENER, Floating 6-32	2-80311A65	100836	2
	SCREW, 4-40 X 1/4 PHM	3-80311A60	10062604	8
	WASHER, #4 Flat	4-7607	100703	5
	WASHER, #4 Splitlock	4-114583	100711	12
	WASHER, #6 Flat	4-1720	100704	12
	WASHER, #6 Splitlock	4-7669	100712	13
	SCREW, 4-40 X 5/16 PHM	3-80311A21	10062605	9
	SCREW, 6-32 X 3/8 PHM	3-80311A24	10063206	8
	HEAT Sink	7-83739K98	A053189	1
	RAIL, Right Side	7-80311A37	B053115	1
	RAIL, Left Side	7-80311A38	B053116	1
	PANEL, Sub Front	64-83739K73	0053685	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION FRONT COVER ASSEMBLY #1-83739K15

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
	HINGE, Take Apart (Excelsior #838 1/4N	55-82728K05	102813	2 pr.
	SCREW, 4-40 X 5/16 FHM	3-80311A68	10072005	2
	WASHER, #4 Splitlock	4-114583	100711	6
	SCREW, 4-40 X 5/16 PHM	3-80311A21	10062605	6
	WASHER, #4 Flat	4-7607	100703	2
	NUT, 4-40 Kep	2-80311A16	100941	
	COVER, Door Latch (Nylatch Assembly)	1-83739K16	100983	1
	LATCH, Modified	1-84206D41	A039099	
	BRACKET, Angle	7-80311A41	B039785	1
	COVER, Hinge,	55-83739K88	B039786	1
	COVER, Stop	7-80311A42	B039411	2
	COVER, Door	15-83739K74	C055039	1
	COVER, Front Modified	15-83739K75	C055038	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION REAR PANEL ASSEMBLY

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
F1	FUSE, 1/2A 3AG 250V	65-475395	100595	1
J1	AC Receptacle	9-82393K02	101288	1
J2	CONNECTOR, BNC	9-82393K04	101155	1
S2	SWITCH, Slide 4 PDT 115-230	40-84209D19	102329	1
S3	SWITCH, Slide DPDT	40-83739K37	102328	1
T1	TRANSFORMER, Power	25-83739K42	B053191	1
U1	REGULATOR, +5V LM309K	51-84209D98	025787	1
XF1	FUSE, Post	9-82083C02	102409	1
	SCREW, 4-40 X 5/16 PHM	3-80311A21	10062605	4
	NUT, 4-40 Small	2-80311A70	100622	2
	SCREW, 6-32 X 1-1/2 PHM	3-80311A69	10063224	4
	NUT, 6-32 Kep	2-80311A17	100862	10
	SCREW, 4-40 X 1/4 PHM	3-80311A60	10062604	6
	SCREW, 6-32 X 3/8 PHM	3-80311A24	10063206	6
	NUT, 4-40 Kep	2-80311A16	100941	6
	WASHER, #4 Splitlock	4-114583	100711	2
	WASHER, #4 Flat	4-7607	100703	2
	SCREW, 4-40 X 3/8 PHM	3-80311A22	10062606	2
	GND. Lug, BNC	29-89601A01	100495	1
	LUG, Solder #6	29-5242	100490	1
	COVER, Plate	64-83739K81	A03112411	1
	COVER, Plate	64-83739K80	02139811	1
	SCREEN, Speaker	35-83739K93	A053695	1
	PANEL, Rear	64-83739K79	0053686	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION LOGIC P.C. ASSEMBLY #1-83739K04

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C1	CAPACITOR, .005 µF dual	23-82393K11	102615	2
C2	Same as C1			
C3	CAPACITOR, 2500 µF, 15V Ax E1	23-82393K13	100247	2
C4	Same as C3			
C5	CAPACITOR, 1 µF, 35V Tant	23-82783B26	100082	2
C6	Same as C5			
C7	CAPACITOR, 250 µF, 25V Ax E1	23-83739K50	102614	2
C8	CAPACITOR, 1000 µF, 16V Ax E1	23-83739K51	103148	1
C9	CAPACITOR, .01 µF, 100V Disc	21-84309A25	100103	1
C10	CAPACITOR, 56 µF, 6V Tant	23-84309A31	100225	2
C11	CAPACITOR, 150 pF, 500 V DM	21-840047	10021901	1
C12	CAPACITOR, 180 pF, 500V DM	21-865440	10023701	1
C13	CAPACITOR, 4.7 µF, 10V Tant	23-84309A32	100205	1
C14	CAPACITOR, 15 pF, 500V DM	23-84309A42	10024101	1
C15	CAPACITOR, 10 pF, 500V DM	21-84309A41	10025301	2
C16	Same as C15			
C17	CAPACITOR, 15 µF, 20V Tant	23-82393K20	100211	4
C18	CAPACITOR, 4.7 µF, 35V Tant	23-84309A37	100071	2
C19	CAPACITOR, .1 µF, 50V Disc	21-84209D49	100178	3
C20	Same as C17			
C21	Same as C19			
C22	Same as C19			
C23	CAPACITOR, .001 µF, 1 kV Disc	21-84209A49	100076	1
C24	CAPACITOR, 2.2 µF, 35V Tant	23-83819K64	100100	1
C25	CAPACITOR, .05 µF, 10V Disc	21-83068E04	100122	4
C26	Same as C17			
C27	Same as C17			
C28	CAPACITOR, 1 µF, 25V Disc	23-82393K12	100226	6
C29	Same as C5			
C30	Same as C25			
C31	Same as C25			
C32	CAPACITOR, 47 µF, 20V Tant	21-82393k17	100186	2
C33	Same as C28			
C34	Same as C32			
C35	Same as C28			
C36	Same as C28			
C37	Same as C18			
C38	CAPACITOR, 47 pF, 500V DM	21-868681	10017101	1
C39	Same as C7			
C40	CAPACITOR, .033 µF, 25V Disc	8-82284C11		
C41	Same as C10			
C42	CAPACITOR, 100 µF, 10V Tant	23-864366	100119	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION LOGIC P.C. ASSEMBLY #1-83739K04 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C43	CAPACITOR, P/O Universal Chassis Assy.			Ref
C44	CAPACITOR, P/O Universal Chassis Assy.			Ref
C45	Same as C25			
C46	Same as C28			
CR1	DIODE, 1N4005	48-82466H18	100413	7
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
CR5	DIODE, 30S05	48-83739K36	103252	2
CR6	Same as CR6			
CR7	DIODE, V SK320		103344	2
CR8	Same as CR7			
CR9	Same as CR1			
CR10	DIODE, 1N4151	48-84309A57	100385	3
CR11	Same as CR1			
CR12	Same as CR1			
CR13	Same as CR1			
CR14	Same as CR1			
VR1	DIODE, Zener 1N4734		100421	1
L1	INDUCTOR, Line Filter	24-82393K10	101328	2
L2	Same as L1			
Q1	TRANSISTOR, P/O Universal Chassis Assy	48-84209D68	101421	
Q2	Not Used			
Q5	TRANSISTOR, 2N4275	48-84209D17	102716	2
Q6	TRANSISTOR, MPS6521		101430	1
Q7	TRANSISTOR, 2N4258	48-04209D16	102675	2
Q8	Same as Q5			
Q9	TRANSISTOR, MPSA12	48-84209D67	101396	1
Q10	Same as Q7			
Q11	TRANSISTOR, 2N3646	48-84305A20	101369	1
R1	RESISTOR, 22K, 1/4W, 5%	6-124A81	101572	9
R2	RESISTOR, 270 Ω 1/2W, 5%		101485	1
R3	Same as R1			
R4	Not Used			
R5	RESISTOR, 1Ω 2W, 5%		102214	1
R6	RESISTOR, 22Ω 1/4W, 5%	6-124A09	101696	1
R7	RESISTOR, 3.3K 1/4W, 5%	6-124A61	101559	3
R8	RESISTOR, 2.2K 1/4W, 5%	6-124A57	101562	3
R9	Not Used			
R10	Not Used			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION LOGIC P.C. ASSEMBLY #1-8373904 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
R11	RESISTOR, 1K 1/4W, 5%	6-124A49	101569	3
R12	RESISTOR, 4.7K 1/4W, 5%	6-124A65	101598	1
R13	RESISTOR, 470Ω 1/4W, 5%	6-124A41	101625	3
R14	RESISTOR, 10K 1/4W, 5%	6-124A73	101570	5
R15	Same as R7			
R16	Same as R13			
R17	Same as R14			
R18	RESISTOR, 3.9K 1/4W, 5%	6-124A63	101601	1
R19	RESISTOR, 220Ω 1/4W, 5%	6-124A33	101566	1
R20	RESISTOR, 1.2K 1/4W, 5%	6-124A51	101581	1
R21	Same as R8			
R22	Same as R8			
R23	Same as R14			
R24	Same as R11			
R25	Same as R7			
R26	Same as R1			
R27	Same as R1			
R28	Same as R1			
R29	RESISTOR, 47K 1/4W, 5%	6-124A89	101574	1
R30	RESISTOR, 27K 1/4W, 5%	6-124A83	101587	2
R31	Same as R30			
R32	Same as R14			
R33	Same as R1			
R34	Same as R1			
R35	Same as R1			
R36	Same as R13			
R37	Same as R11			
R38	RESISTOR, 4.3K 1/4W, 5%	6-124A64	101546	1
R39	Same as R1			
R40	RESISTOR, 8.2K 1/4W, 5%	6-124A71	101595	1
R41	Same as R14			
S1	SWITCH, Pushbutton 7 position	40-83739K38	055064	1
U3	INTEGRATED CIRCUIT, SN7490N	51-84309A76	025732	5
U4	Same as U3			
U5	INTEGRATED CIRCUIT, SN7400N	51-84309A73	019705	5
U6	INTEGRATED CIRCUIT, SN7451N	51-84084D11	025707	1
U7	INTEGRATED CIRCUIT, MC4044P	51-84688D29	045238	1
U8	INTEGRATED CIRCUIT, SN74123N	51-84805E19	045209	5
U9	INTEGRATED CIRCUIT, SN7474N	51-84309A77	025241	3
U10	Same as U5			
U11	Same as U3			
U12	Same as U3			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION LOGIC P.C. ASSEMBLY #1-8373904 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
U13	Same as U3			
U14	Same as U8			
U15	Same as U8			
U16	Same as U8			
U17	INTEGRATED CIRCUIT, MC3002P	51-84204D29	025739	2
U18	INTEGRATED CIRCUIT, MC3001P	51-84708G05	025740	3
U19	Same as U18			
U20	Same as U9			
U21	Same as U5			
U22	INTEGRATED CIRCUIT, SN74S64N	51-83739K20	045222	1
U23	INTEGRATED CIRCUIT, SN745S132N	51-84209D56	045271	1
U24	INTEGRATED CIRCUIT, SN7426N	51-84084D21	045252	2
U25	Same as U9			
U26	Same as U24			
U27	Same as U5			
U28	Same as U18			
U29	INTEGRATED CIRCUIT, MC3003P	51-84204D34	025767	1
U30	Same as U17			
U31	INTEGRATED CIRCUIT, MK5009	51-84209D62	045214	1
U32	INTEGRATED CIRCUIT, SN74S112N	51-84810F04	025786	1
U33	INTEGRATED CIRCUIT, SN74196N	51-84084D76	025784	1
U34	INTEGRATED CIRCUIT, SN7442N	51-4484D09	025749	1
U35	INTEGRATED CIRCUIT, N8281A	51-84209D63	025727	1
U36	INTEGRATED CIRCUIT, NE555V	51-84320A93	045208	1
U37	INTEGRATED CIRCUIT, A055178		055178	7
U38	Same as U37			
U39	Same as U37			
U40	Same as U37			
U41	Same as U37			
U42	INTEGRATED CIRCUIT, DM85L51N	51-83739K21	045210	1
U43	Same as U37			
U44	Same as U37			
U45	Same as U5			
U46	Same as U8			
XA2	CONNECTOR, PC 10 Pin	9-83739K64	1101165	2
	SWAGE, Terminal	29-84209D51	100482	83
	SWAGE, Terminal	29-84209D52	100508	9

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION — A3, READOUT P.C. ASSEMBLY 8-DIGIT #1-83739K05

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
CR1	DIODE, led	48-84209D73	100460	5
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
CR5	Same as CR1			
Q1	TRANSISTOR, MPS A42	48-84209D68	101421	8
Q2	TRANSISTOR, PN 4889	48-84209D69	101422	8
Q3	Same as Q1			
Q4	Same as Q1			
Q5	Same as Q1			
Q6	Same as Q2			
Q7	Same as Q1			
Q8	Same as Q2			
Q9	Same as Q1			
Q10	Same as Q2			
Q11	Same as Q1			
Q12	Same as Q2			
Q13	Same as Q1			
Q14	Same as Q2			
Q15	Same as Q1			
Q16	Same as Q2			
R1	RESISTOR, 1K 1/4W, 5%	6-124A49	101569	2
R2	Same as R1			
R3	RESISTOR, 2.2K 1/4W, 5%	6-124A57	101562	8
R4	RESISTOR, 390K 1/4W, 5%	6-124A12	101787	8
R5	RESISTOR, 4.7K 1/4W, 5%	6-124A65	101598	9
R6	Same as R3			
R7	Same as R4			
R8	Same as R5			
R9	Same as R3			
R10	Same as R4			
R11	Same as R5			
R12	Same as R3			
R13	Same as R4			
R14	Same as R5			
R15	Same as R3			
R16	Same as R4			
R17	Same as R5			
R18	Not Used			
R19	Not Used			
R20	Not Used			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A3, READOUT P.C. ASSEMBLY 8-DIGIT #1-83739K05 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
R21	Not Used			
R22	Same as R5			
R23	RESISTOR, 270Ω 1/4W, 5%	6-124A35	101542	5
R24	Same as R23			
R25	Same as R23			
R26	RESISTOR, 330K 1/4W, 5%	6-024B10	101658	14
R27	Same as R26			
R28	Same as R26			
R29	Same as R26			
R30	Same as R26			
R31	Same as R3			
R32	Same as R4			
R33	Same as R5			
R34	Same as R3			
R35	Same as R4			
R36	Same as R5			
R37	Not Used			
R38	Not Used			
R39	Same as R3			
R40	Same as R4			
R41	Same as R5			
R42	Same as R26			
R43	Same as R26			
R44	Same as R26			
R45	Same as R26			
R46	Same as R26			
R47	Same as R26			
R48	Same as R26			
R49	Same as R26			
R50	Same as R26			
R51	Same as R23			
R52	Same as R23			
	SPACER	43-84209D84	101077	5

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A3, AMPLIFIER ASSEMBLY #1-83739K03

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C1	Not Used			
C2	CAPACITOR, .1 µF, 600V Mylar	8-82393K05	100158	1
C3	CAPACITOR, .001 µF, 1 kV Disc	21-84309A49	100076	2
C4	Not Used			
C5	CAPACITOR, 1 µF, 25V Disc	21-84208D96	100176	3
C6	CAPACITOR, 1.05 µF, 50V Disc	21-180A84	100134	6
C7	CAPACITOR, 180/220 µF, 16V		102621	1
C8	CAPACITOR, .01 µF, 100V Disc	21-84309A25	100103	8
C9	Same as C3			
C10	CAPACITOR, 330 µF, 6V Tant	23-83739K55	100188	2
C11	Same as C8			
C12	CAPACITOR, 150 pF, 500V DM-15	21-840047	10021901	1
C13	Same as C6			
C14	Same as C10			
C15	Same as C5			
C16	CAPACITOR, 22 pF, 500V D.M.	21-83409A27	10006801	1
C17	Not Used			
C18	Same as C7			
C19	Same as C6			
C20	Same as C6			
C21	CAPACITOR, .1 µF 10V Disc	21-84309A26	100120	2
C22	Same as C21			
C23	CAPACITOR, 15 µF, 20V Tant	23-82393K20	100211	1
C24	Same as C6			
C25	Same as C6			
C26	Same as C18			
C27	Same as C18			
C28	Same as C18			
C29	Same as C18			
C30	Same as C18			
C31	Same as C18			
CR1	DIODE, FD700	48-84309A52	100435	2
CR2	Same as CR1			
CR3	DIODE, N4829	48-84209D72	100443	2
CR4	Same as CR3			
L1	INDUCTOR, .33 µH	24-84204D63	101324	2
L2	Same as L1			
Q1	Not Used			
Q2	TRANSISTOR, MFE 121		101413	1
Q3	TRANSISTOR, 2N4275	48-84209D17	102716	3
Q4	Same as Q3			
Q5	Same as Q3			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A3, AMPLIFIER ASSEMBLY #1-83739K03 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
Q6	TRANSISTOR, 2N3904	48-84066A57	101377	1
R1	RESISTOR, POT, 2M 1/4W, 5%		053516	1
R2	RESISTOR, 10K 1/4W, 5%	6-124A73	101570	3
R3	Not Used			
R4	Not Used			
R5	Not Used			
R6	RESISTOR, 1M 1/4W, 5%	6-124B22	101605	1
R7	RESISTOR, Pot, 100K 3339W	18-83739K43	100027	1
R8	RESISTOR, 330K 1/4W, 5%	6-124B10	101658	1
R9	NOT USED			
R10	RESISTOR, 200Ω 1/4W, 5%	6-124A32	101555	1
R11	RESISTOR, 100K	6-124A97	101558	2
R12	RESISTOR, 33K	6-124A85	101576	1
R13	RESISTOR, 270Ω	6-124A35	101542	1
R14	RESISTOR, 100Ω	6-124A25	101609	1
R15	RESISTOR, 1.3K	6-84206D12	101556	1
R16	Same as R2			
R17	RESISTOR, 1.1K 1/4W, 5%	6-124A50	101589	1
R18	RESISTOR, 300Ω 1/4W, 5%	6-124A36	101537	2
R19	RESISTOR, 47Ω 1/4W, 5%	6-124A17	101560	1
R20	Same as R11			
R21	Same as R18			
R22	RESISTOR, 27 Ω 1/4W, 5%		101729	1
R23	RESISTOR, 680Ω 1/4W, 5%	6-124A45	101669	1
R24	Same as R2			
R25	RESISTOR, Pot, 20K 3339W	18-83739K44	100028	1
R26	RESISTOR, 51Ω 1/4W, 5%	6-124A18	101672	1
R27	RESISTOR, 820Ω 1/4W, 5%	6-124A47	101567	1
R28	RESISTOR, 510Ω 1/4W, 5%	6-124A42	101616	1
TP1	TEST POINT, Brown	9-84209D36	100521	1
U1	INTEGRATED CIRCUIT, SN74S132N		045271	1
VR1	DIODE, FZ902	48-84204D10	102736	1
	TERMINAL, lug	29-84209D51	100482	2
	AMPLIFER, Mtg. Brkt.	7-80311A43	053117	1
	STANDOFF, 4-40 X 1/8	29-80311A50	100492	4
	BNC, Long Shank	9-84205D81	101170	1
	BNC, Spacer 1/8" thick	43-80311A49	045062	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A3, AMPLIFIER ASSEMBLY #1-83739K03 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
	SCREW, 4-40 X 1/4 PHM	3-80311A60	10062604	4
	WASHER, #4 Flat	4-7607	100703	4
	WASHER, #4 Split	4-114583	100711	4
	BNC, GND lug	29-89601A01	100495	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A4, PRESCALER P.C. ASSEMBLY #1-83839K02

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C1	CAPACITOR, .056 µF, 100V, Chip	21-84309A23	100257	14
C2	Same as C1			
C3	Same as C1			
C4	Same as C1			
C5	Same as C1			
C6	CAPACITOR, .001 µF, 50V, C Mold	21-82187B14	100251	6
C7	Same as C6			
C8	Same as C1			
C9	Same as C1			
C10	CAPACITOR, 16 pF, 100V, Chip	21-84309A24	100256	3
C11	Same as C1			
C12	CAPACITOR, 47 pF, 100V, Chip	21-83739K56	100315	2
C13	Same as C1			
C14	Same as C10			
C15	Same as C1			
C16	Same as C12			
C17	Same as C10			
C18	Same as C1			
C19	Same as C6			
C20	Same as C6			
C21	CAPACITOR, 10 pF, 100V, Chip	21-83739K57	103185	1
C22	Same as C6			
C23	Same as C1			
C24	CAPACITOR, 1 µF, 25V, Disc	21-84208D96	100176	1
C25	CAPACITOR, 10 µF, 20V, Tant	23-82783B27	100063	1
C26	Same as C1			
C27	Same as C1			
C28	CAPACITOR, 47 pF 500V, D.M.	21-868681	10017101	1
C29	CAPACITOR, .1 µF, 10V, Disc	21-84309A26	100120	2
C30	CAPACITOR, .05 µF 10V Disc	21-83068E04	100122	3
C31	Same as C29			
C32	CAPACITOR, .01 µF, 100V, Disc	21-84309A25	100103	3
C33	Same as C32			
C34	Same as C32			
C35	Same as C30			
C36	Same as C30			
C37	Same as C6			
CR1	DIODE, HP5082-2800	48-84309A58	100442	6
CR2	Same as CR1			
CR3	Same as CR1			
CR4	Same as CR1			
CR5	Same as CR1			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A4, PRESCALER P.C. ASSEMBLY #1-83839K02 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
CR6	DIODE, FD700	48-84309A52	100435	2
CR7	Same as CR6			
CR8	Same as CR1			
CR9	DIODE, 1N4151	48-84309A57	100385	2
CR10	Same as CR9			
J1	CONNECTOR, BNC, Lg. Shank	9-84205D81	101170	1
L1	INDUCTOR, 100 µH	24-84309A87	101320	2
L2	Same as L1			
L3	INDUCTOR, Printed on Board			REF
L4	Same as L3			
L5	Same as L3			
L6	Ferrite Bead		112420	1
L6	INDUCTOR, .05 µH	24-84309A87	101323	3
L7	Same as L6			
L8	Same as L6			
M1	METER	72-83739K40	053610	1
Q1	TRANSISTOR, 2N6304	48-869702	103171	5
Q2	Same as Q1			
Q3	Same as Q1			
Q4	Same as Q1			
Q5	Same as Q1			
Q6	TRANSISTOR, 2N4258	48-8420916	102675	2
Q7	TRANSISTOR, 2N4275	48-84209D17	102716	
Q8	TRANSISTOR, 2N3646	48-84305A20	101369	2
Q9	Same as Q8			
Q10	TRANSISTOR, 2N3904	48-84066A57	101377	1
R1	RESISTOR, 33Ω 1W, 5%	6-126A13	101878	2
R2	RESISTOR, 22Ω 1/2W, 5%	6-125A09	106011	1
R3	Same as R1			
R4	RESISTOR, 51Ω 1/4W, 5%	6-124A18	101672	1
R5	RESISTOR, 200Ω 1W, 5%	6-126A32	101783	2
R6	Same as R5			
R7	RESISTOR, 120K 1/8W, 5%	6-185A99	101825	1
R8	RESISTOR, 560K 1/8W, 5%	6-185B16	102015	1
R9	RESISTOR, 3.9K 1/8W, 5%	6-185A63	101714	1
R10	RESISTOR, 10K 1/8W, 5%	6-185A73	101697	2
R11	RESISTOR, Pot 1K, Side Adj.	18-83739K46	102129	1
R12	RESISTOR, 8.2K 1/8W, 5%	6-185A71	101799	2
R13	RESISTOR, 2M 1/8W, 5%	6-185B29	101959	1
R14	RESISTOR, 100K 1/8W, 5%	6-185A97	101976	1
R15	RESISTOR, 1K 1/8W, 5%	6-185A49	101711	6

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A4, PRESCALER P.C. ASSEMBLY #1-83839K02 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
R16	RESISTOR, 4.7K 1/8W, 5%	6-185A65	101792	1
R17	RESISTOR, 27K 1/8W, 5%	6-185A83	101952	1
R18	RESISTOR, 15K 1/8W, 5%	6-185A77	101698	1
R19	Same as R15			
R20	RESISTOR, 82Ω 1/8W, 5%	6-185A23	101800	3
R21	RESISTOR, 27Ω 1/8W, 5%	6-185A11	101810	3
R22	RESISTOR, 3K 1/8W, 5%	6-185A60	101913	3
R23	Same as R15			
R24	Same as R20			
R25	Same as R21			
R26	RESISTOR, 51Ω 1/8W, 5%	6-185A18	101815	3
R27	Same as R22			
R28	Same as R15			
R29	Same as R20			
R30	Same as R21			
R31	Same as R26			
R32	Same as R22			
R33	RESISTOR, 6.8K 1/8W, 5%	6-185A69	101716	1
R34	RESISTOR, Pot 10K, Side Adj.	18-83739K45	100026	2
R35	RESISTOR, 180Ω 1/8W, 5%	6-185A31	101720	2
R36	RESISTOR, 100Ω 1/8W, 5%	6-185A25	101701	3
R37	Same as R26			
R38	RESISTOR, 1.8K 1/8W, 5%	6-185A55	101712	1
R39	RESISTOR, 2.7K 1/8W, 5%	185A59	101803	1
R40	Same as R36			
R41	Same as R35			
R42	RESISTOR, 33K 1/8W, 5%	6-185A85	101693	1
R43	RESISTOR, 470Ω 1/8W, 5%	6-185A41	101709	1
R44	Same as R36			
R45	RESISTOR, 220Ω, 1/8W, 5%		101798	2
R46	Same as R12			
R47	Same as R45			
R48	RESISTOR, 56K 1/8W, 5%	6-185A91	101823	1
R49	Same as R10			
R50	Same as R15			
R51	Same as R34			
R52	RESISTOR, 5.6K 1/8W, 5%	6-185A67	101715	4
R53	Same as R52			
R54	Same as R52			
R55	Same as R52			
R56	Same as R15			
R57	RESISTOR, 1M 1/8W, 5%	6-185B22	101695	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A4, PRESCALER P.C. ASSEMBLY #1-83839K02 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
U1	INTEGRATED CIRCUIT, LM4250CH	51-83739K22	045258	1
U2	INTEGRATED CIRCUIT, LM301A	51-84204D30	025745	1
U3	INTEGRATED CIRCUIT, SP630C	51-83739K23	045211	1
U4	INTEGRATED CIRCUIT, NE555V	51-84320A93	045208	1
VR1	ZENER DIODE, 1N961A		100395	1
VR2	ZENER DIODE, 1N749	48-83461E13	100419	1
XU3	SOCKET, IC, 14 Pin	9-83739K65	101281	14
	BRACKET, Meter Mtg.	7-80311A44	053114	2
	BRACKET, Board Mtg.	7-80311A45	053609	1
	TERMINAL, SWAGE	29-84209D51	100482	2
	TERMINAL, SWAGE	29-84209D52	100508	2
	SPACER, BNC 1/8" thick	43-80311A49	045062	1
	SCREW, 2-56 X 1/4, PHM	3-80311A60	10062504	1
	WASHER, #2 Flat	4-80311A76	100614	4
	WASHER, #2 Split	4-80311A77	100661	4
	LUG, Solder, BNC	29-89601A01	100495	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A5, OSCILLATOR P.C. ASSEMBLY #1-83739K01

REF. #	DESCRIPTION	MOTOROLA PART NO.	S–D PART NO.	QTY PER ASSY
C1	CAPACITOR, 9-35 pF, Right Angle Adj.	20-84209D87	100159	1
C2	CAPACITOR, 15-60 pF, Top Adj.	20-82399D07	100234	1
C3	CAPACITOR, 150 pF, D.M.	21-840047	100219	1
C4	CAPACITOR, 100 pF, D.M.	21-850118	10017301	1
C5	CAPACITOR, 220 pF, D.M.	21-84309A33	10022001	1
C6	CAPACITOR, 33 pF, D.M.	21-847772	10017501	1
C7	CAPACITOR, 10 pF, D.M.	21-84309A41	10025301	1
C8	CAPACITOR, .01 µF 100V, Disc	21-84309A25	100103	1
C9	CAPACITOR, .05 µF 12V, Disc	21-83068E04	100122	1
Q1	TRANSISTOR, 2N4258	48-84209D16	102675	1
Q2	TRANSISTOR, 2N4275	48-84209D17	102716	2
Q3	Same as Q2			
R1	RESISTOR, 47K 1/4W, 5%	6-124A89	101574	1
R2	RESISTOR, 100K 1/4W, 5%	6-124A97	101558	1
R3	RESISTOR, 4.7K 1/4W, 5%	6-124A65	101598	1
R4	RESISTOR, 10K 1/4W, 5%	6-124A73	101570	1
R5	RESISTOR, 1K 1/4W, 5%	6-124A49	101569	1
R6	RESISTOR, 3.3K 1/4W, 5%	6-124A61	101559	1
R7	RESISTOR, 470Ω 1/4W, 5%	6-124A41	101625	1
Y1	CRYSTAL to-5	48-84209D76	039483	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION 06 OPT. BATTERY PACK FINAL ASSEMBLY SLN-6421A

REF. #	DESCRIPTION	MOTOROLA PART NO.	S–D PART NO.	QTY PER ASSY
A6	P.C. Board Assembly, Power Inverter	1-83739K06	05317501	1
BT1	BATTERY	60-83739K69	100042	2
BT2	Same as BT1			
Q1	TRANSISTOR, 2N5193	48-82393K14	101405	3
Q2	Same as Q1			
Q3	Same as Q1			
	SCREW, 4-40 X 5/16, PHMS	3-80311A21	10062605	11
	SCREW, 6-32 X 5/16, PHMS	3-80311A23	10063205	10
	SCREW, 6-32 X 3/8, PHMS	3-80311A24	10063206	4
	WASHER, #6 Flat	4-1720	100704	14
	WASHER, #6 Splitlock	4-7669	100712	14
	WASHER, #4 Flat	4-7607	100703	4
	WASHER, #4 Splitlock	4-114583	100711	8
	CLIP, Terminal	42-80311A51	101064	1
	HEATSINK, Right	7-80311A46	053188	1
	Battery Clamp Assembly, Front	1-83739K17	04561401	1
	BATTERY CLAMP, Front	42-83739K95	045614	1
	Battery Clamp Assembly, Rear	1-83739K18	04561501	1
	BATTERY CLAMP, Rear	42-83739K96	045615	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION 07 OPT. FINAL ASSEMBLY SLN-6422A

REF. #	DESCRIPTION	MOTOROLA PART NO.	S–D PART NO.	QTY PER ASSY
A6	P.C. Board Assembly, Power Inverter	1-83739K06	05317501	1
J4	BANNANA JACK Min. Red	46-83739K89	101275	1
J5	BANNANA JACK Min. Black	46-83739K90	101276	1
Q1	TRANSISTOR, 2N5193	48-82393K14	101405	3
Q2	Same as Q1			
Q3	Same as Q1			
	SCREW, 6-32 PHM	3-80311A23	10063205	6
	SCREW, 4-40 X 5/16 PHM	3-80311A21	10062605	3
	SCREW, 6-32 X 3/8 PHMS	3-80311A24	10063206	2
	WASHER, #6 Splitlock	4-7669	100712	6
	WASHER, #6 Flat	4-1720	100704	6
	HEATSINK, Right	7-80311A46	053188	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A6, POWER INVERTER P.C. ASSEMBLY #1-83739K06

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C1	CAPACITOR, 150 µF, 15V	23-83739K52	100209	1
C2	CAPACITOR, .05 µf	21-83068E04	100122	1
C3	CAPACITOR, 4.7 µF, 10V	23-84309A32	100205	1
C4	CAPACITOR, 1 µF, 25V	21-84208D96	100176	3
C5	CAPACITOR, .1 µF, 10V, Disc	21-84309A26	100120	1
C6	Same as C4			
C7	Same as C4			
CR1	DIODE, 1N4005	48-82409D51	100413	3
CR2	DIODE, 1N4151	48-84309A57	100385	5
CR3	Same as CR1			
CR4	Same as CR2			
CR5	Same as CR2			
CR6	Same as CR1			
CR7	Same as CR2			
CR8	Same as CR2			
Q1	Part Of Final Assembly			
Q2	Same as Q1			
Q3	Same as Q1			
Q4	TRANSISTOR, 2N3646	48-84305A20	101369	4
Q5	Same as Q4			
Q6	Same as Q4			
Q7	Same as Q4			
Q8	TRANSISTOR, 2N3638	48-83699E64	101360	1
Q9	TRANSISTOR, 2N3904	48-84066A57	101377	2
Q10	Same as Q9			
R1	RESISTOR, 39Ω 1/4W, 5%	6-124E15	101733	1
R2	RESISTOR, 390Ω 1/4W, 5%	6-124A39	101592	4
R3	RESISTOR, 120Ω 1/4W, 5%	6-124A27	101717	1
R4	RESISTOR, 1Ω 2W, 5% WW		102214	1
R5	Same as R2			
R6	Same as R2			
R7	Same as R2			
R8	RESISTOR, 10K 1/4W, 5%	6-124A73	101570	8
R9	Same as R8			
R10	RESISTOR, 47Ω 1/4W, 5%	6-124A17	101560	2
R11	Same as R8			
R12	Same as R8			
R13	RESISTOR, 910K 1/4W, 5%	6-124B21	101885	4
R14	RESISTOR, 3.9K 1/4W, 5%	6-124A63	101601	2
R15	RESISTOR, Pot 100K 3339H	18-84209D78	102298	2

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION A6, POWER INVERTER P.C. ASSEMBLY #1-83739K06 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
R16	RESISTOR, 270K 1/4W, 5%	6-124B08	101769	2
R17	Same as R13			
R18	Same as R8			
R19	Same as R8			
R20	Same as R10			
R21	Same as R8			
R22	Same as R8			
R23	Same as R13			
R24	Same as R14			
R25	Same as R15			
R26	Same as R16			
R27	Same as R13			
R28	RESISTOR, 510Ω 1/4W, 5%	6-124A42	101616	1
R29	RESISTOR, 1K 1/4W, 5%	6-124A49	101569	1
U1	INTEGRATED CIRCUIT, Power Inverter	1-84209D92	04562261	1
U2	INTEGRATED CIRCUIT, LM3900	51-84209D66	045213	1
VR1	DIODE, 1N957B	48-818459	100416	1
VR2	DIODE, 1N746A	48-84209D70	100415	2
VR3	Same as VR2			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION 08 OPT. TCXO OSCILLATOR ASSEMBLY #1-83739K09

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
	DELETE			
A5	Standard Oscillator P.C. Assembly	1-83739K01	05318301	1
	ADD			
A5	P.C. Assembly, TCXO Oscillator	1-83739K07	05318401	1
Sep P L	TCXO Oscillator Assembly, 08 Opt.	1-83739K09	053411	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION 08 OSCILLATOR P.C. ASSEMBLY #1-83739K07

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
Y1	OSCILLATOR, TCXO, 10 MHz	1-83739K08	100033	1
	P.C. ASSEMBLY, TCXO OSCILLATOR	1-83739K07	05318401	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION OPTS 11,12 & 13 OSCILLATOR CHASSIS ASSY #1-83739K13

REF. #	DESCRIPTION	MOTOROLA PART NO.	S–D PART NO.	QTY PER ASSY
U1	INTEGRATED CIRCUIT, MC7824CP	51-83819K42	045246	1
Sep PL	Oscillator Control P.C. Assembly	1-83738K12	05318501	1
	OSCILLATOR CHASSIS	27-83739K97	053177	1
	TRANSFORMER	25-84204D46	019805	1
	OSCILLATOR, Mtg. Bracket	7-80311A47	039044	1
	NUT, Tinnerman 6-32	2-80311A64	101123	1
	SCREW, 4-40 X 1 1/4 PHM	3-80311A71	10062620	2
	SCREW, 6-32 X 5/16 PHM	3-80311A23	10063205	5
	SCREW, 6-32 X 3/8 PHM	3-80311A24	10063206	5
	WASHER, #4 Splitlock	4-114583	100711	3
	WASHER, #6 Flat	4-1720	100704	3
	WASHER, #6 Splitlock	4-7669	100712	10
	ANCHOR TIE	42-80311A52	37021790	1
	SCREW, 4-40 X 5/16	3-80311A21	10062605	1
	NUT, 4-40	2-80311A70	100622	1
	WASHER, #4 Flat	4-7607	100703	2
	HEATSINK	7-83739K99	053178	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION OPT 12 HIGH STABILITY OSCILLATOR ASSY #1-83739K11

REF. #	DESCRIPTION	MOTOROLA PART NO.	S–D PART NO.	QTY PER ASSY
A5	OSCILLATOR P.C. Assembly 10 MHz	1-83739K01	05318301	1
A7	OSCILLATOR CHASSIS Assembly	1-83739K13	05321501	1
U2	OSCILLATOR, High Stability	1-83739K10	033427	1
	OSCILLATOR, OPT 12 Final Assembly	1-83739K11	053514	
	SCREW, 6-32 X 3/8 PHM	3-80311A24	10063206	5
	WASHER, #6 Splitlock	4-7669	100712	5
	WASHER, #6 Flat	4-1720	100704	4
	HEATSINK, Right	7-83739K98	02139811	1
	OSCILLATOR, Cover Plate	64-83739K80	02139811	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION SLN-6408A TEST ASSEMBLY DEVIATION METER

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
A1	ADAM P.C. Assembly	1-83739K14	05344101	1
CR101	DIODE, Led, Orange	48-83739K30	103201	1
CR102	DIODE, Led, Red	48-83739K29	103200	1
J101	CONNECTOR, BNC	9-84205D81	101170	1
J102	CONNECTOR, 14 Pin	9-83739K66	101180	1
M1	METER	72-83739K41	053855	1
R301	RESISTOR, Pot, 100K, Panel Mount	18-82778K01	102221	1
R302	RESISTOR, Pot, 50K, Panel Mount	18-83739K47	102239	1
S1	SWITCH, 4 Position, P/B	40-83739K39	055097	1
S2	SWITCH, Toggle, MOM, SPDT	40-8420D71	102324	1
S3	SWITCH, Toggle, SPDT	40-8420D69	102310	1
	PLUG-IN, Sub Panel	64-82729K84	0053688	1
	REAR PANEL	64-83739K83	055120	1
	DECORATIVE PANEL	64-83739K82	0053689	1
	TOP COVER	15-83739K85	055121	1
	COMPONENT SHIELD	26-80311A48	053864	1
	KNOB, Skirted w/Dot	36-84209D33	102764	1
	DRESS NUT, 1/4-40	2-80311A48	100893	2
	NUT, #2 hex	2-7041	100636	2
	SCREW, 6-32 X 5/16 PHM	3-80311A23	10063205	6
	SCREW, #2-56 X 3/16 FHM	3-80311A28	10070003	2
	SCREW, 2-56 X 5/16	3-80311A74	10062505	2
	SCREW, #2-56 X 5/16 PHM	3-80311A72	10062503	2
	SCREW, 4-40 X 5/16	3-80311A21	10062605	11
	WASHER, #6 Flat	4-1720	100704	6
	WASHER, #6 Splitlock	4-7669	100712	6
	WASHER, #4 Flat	4-7607	100703	3
	WASHER, #4 Splitlock	4-114583	100711	11
	WASHER, #2 Splitlock	4-80311A77	100661	4
	CARD GUIDE	46-83739K91	100866	6
	SPACER, #2-56 X 5/16	43-80311A73	103226	2
	LUG, Solder BNC	29-89601A01	100495	1
	LUG, Solder #10	29-5247	100491	2

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION ADAM P.C. ASSEMBLY #1-83739K14

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C1	CAPACITOR, .056 µF, 100V Chip		100257	7
C2	CAPACITOR, .001 µF, 50V Mold	21-82187B14	100251	3
C3	Same as C1			
C4	Same as C1			
C5	CAPACITOR, .1 µF, 50V Disc	21-84209D49	100178	20
C6	Same as C5			
C7	Same as C1			
C8	Same as C1			
C9	Same as C1			
C10	Same as C5			
C11	CAPACITOR, .001 µF, 1 kV Disc	21-84309A49	100076	3
C12	Same as C1			
C13	CAPACITOR, 1 µF, 25V Disc	21-84208D96	100176	8
C14	CAPACITOR, 100 µF, 25V El Ax	23-82683B04	100165	7
C15	CAPACITOR, 15-60 pF, VARCER	20-82399D07	100234	4
C16	Same as C5			
C17	CAPACITOR, .05 µF, 10V Disc	21-83068E04	100122	9
C18	Same as C17			
C19	Same as C5			
C20	CAPACITOR, 1000 pF, 100V C.M.	21-84309A47	10024301	2
C21	Same as C17			
C22	Same as C20			
C23	Same as C5			
C24	CAPACITOR, 27 pF, 100V Chip		100299	1
C25	CAPACITOR, 15 pF, 100V Chip	21-84309A24	100256	2
C26	Same as C25			
C27	CAPACITOR, .01 µF, 100V Disc	21-84309A25	100103	5
C28	Same as C27			
C29	Same as C17			
C30	CAPACITOR, .05 µF, 50V Disc	21-180A84	100134	7
C31	Same as C30			
C32	Same as C5			
C33	Same as C5			
C34	Same as C30			
C35	Same as C17			
C36	Same as C17			
C37	Same as C17			
C38	Same as C17			
C39	Same as C5			
C40	Same as C5			
C41	Same as C30			
C42	CAPACITOR, 9-35 pF VARCER	20-82399D05	100135	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION ADAM P.C. ASSEMBLY #1-83739K14 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C43	Same as C17			
C44	CAPACITOR, 1000 µF, 10V El Ax	23-83739K53	102596	1
C45	Same as C13			
C46	CAPACITOR, 470 pF, 300V D.M.	21-82537B06	10022101	3
C47	Same as C15			
C48	CAPACITOR, 110 pF, 500V D.M.	21-83739K58	102573	1
C49	Not Used			
C50	Same as C46			
C51	CAPACITOR, 82 pF, 500V D.M.	21-83819K71	10017201	1
C52	Same as C15			
C53	CAPACITOR, 22 µF, 15V Tant	23-82783B32	100125	4
C54	Same as C15			
C55	Same as C5			
C56	Same as C27			
C57	Same as C5			
C58	Same as C14			
C59	Same as C5			
C60	Same as C5			
C61	Same as C30			
C62	Same as C30			
C63	Same as C30			
C64	Same as C27			
C65	Same as C5			
C66	Same as C14			
C67	Same as C5			
C68	Same as C27			
C69	Same as C5			
C70	CAPACITOR, 39 µF, 20V Tant	23-84209D30	102561	2
C71	Same as C70			
C72	Same as C13			
C73	CAPACITOR, .47 µF, 100V Myl	8-83739K60	100061	1
C74	Same as C11			
C75	CAPACITOR, 1 µF, 100V Ply Crb 5%	8-84209D37	100341	1
C76	Same as C53			
C77	Same as C5			
C78	CAPACITOR, .01 µF, 50V 5%		100132	4
C79	CAPACITOR, 56 pF, 500V D.M.	21-84309A28	10017901	1
C80	Same as C13			
C81	Same as C11			
C82	CAPACITOR, 5 pF, 500V D.M.	21-81966	100218	2
C83	Same as C78			
C84	CAPACITOR, .0068 µF, 200V Myl	8-83819K68	100192	1
C85	Same as C78			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION ADAM P.C. ASSEMBLY #1-83739K14 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C86	CAPACITOR, 3.9 µF, 35V Tant	23-83739K54	100180	2
C87	Same as C86			
C88	Same as C13			
C89	Same as C13			
C90	CAPACITOR, 33 pF, 500V D.M.	21-847772	10017501	1
C91	Same as C82			
C92	CAPACITOR, 4.7 µF, 25V Tant	23-84762H05	102609	1
C93	Same as C53			
C94	Same as C13			
C95	CAPACITOR, .0022 µF, 200V Myl	8-83739K62	100185	1
C96	CAPACITOR, 330 pF, D.M.	21-873267	10027601	1
C97	Same as C78			
C98	Same as C46			
C99	CAPACITOR, .033 µF, 200V Myl	8-83819K69	102916	1
C100	Same as C53			
C101	CAPACITOR, 2.2 µF, 20V Tant	23-84762H04	100203	1
C102	Same as C14			
C103	Same as C14			
C104	CAPACITOR, 250 µF, 25V El Ax	23-8373950	102614	2
C105	Same as C5			
C106	Same as C2			
C107	Same as C2			
C108	Same as C14			
C109	Same as C14			
C110	Same as C5			
C111	Same as C104			
C112	CAPACITOR, 22 µF, 15V, Tant	23-82783B32	100125	1
C113	Same as C13			
CR1	DIODE, 5082-2800	48-84309A58	100442	16
CR2	DIODE, A5S138	48-83739K34	103197	3
CR3	Same as CR2			
CR4	Same as CR2			
CR5	Same as CR1			
CR6	Same as CR1			
CR7	Same as CR1			
CR8	Same as CR1			
CR9	Same as CR1			
CR10	Same as CR1			
CR11	DIODE, 5052-0112	48-84749K35	103196	1
CR12	Same as CR1			
CR13	Same as CR1			
CR14	Same as CR1			
CR15	Same as CR1			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION ADAM P.C. ASSEMBLY #1-83739K14 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
CR16	Same as CR1			
CR17	DIODE, MV2114	48-84204D03	100438	1
CR18	DIODE, 1N4151	48-84309A57	100385	11
CR19	Same as CR18			
CR20	Same as CR18			
CR21	Same as CR18			
CR22	Same as CR18			
CR23	Same as CR18			
CR24	Same as CR18			
CR25	Same as CR18			
CR26	Same as CR1			
CR27	Same as CR1			
CR28	Same as CR1			
CR29	Same as CR18			
CR30	Same as CR18			
CR31	DIODE, 1N4005	48-82466H18	100413	2
CR32	Same as CR31			
CR33	Same as CR1			
CR34	Same as CR18			
FL1	FM4 Matched Set of 3		055489	1
FL2	Part of FL1			
FL3	Part of FL1			
J1	CONNECTOR	9-83739K68	101260	1
L1	INDUCTOR, 470 µH	24-84309A91	101297	4
L2	INDUCTOR, 100 µH	24-84309A90	101306	7
L3	Same as L1			
L4	Same as L1			
L5	Same as L2			
L6	Same as L2			
L7	INDUCTOR, Wire Loop			
L8	Same as L7			
L9	INDUCTOR, 2.7 µH		101299	1
L10	Same as L2			
L11	Same as L2			
L12	INDUCTOR, 6.8 µH	24-84204D56	101300	3
L13	Same as L12			
L14	Same as L12			
L15	INDUCTOR, Shielded .27 µH		055551	1
L16	Same as L2			
L17	Same as L2			
L18	INDUCTOR, 1 mH	24-84204D58	101303	1
L19	INDUCTOR		055098	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION ADAM P.C. ASSEMBLY #1-83739K14 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
L20	Same as L1			
Q1	TRANSISTOR, 2N4275	48-84209D17	102716	11
Q2	TRANSISTOR, MFE121	48-84204D18	101413	1
Q3	TRANSISTOR, 2N3565	48-83042H70	101371	4
Q4	TRANSISTOR, SPF759	48-84204D20	101416	1
Q5	TRANSISTOR, 2N4264	48-84204D18	101412	1
Q6	Same as Q1			
Q7	Same as Q3			
Q8	Same as Q1			
Q9	Same as Q1			
Q10	Same as Q1			
Q11	Same as Q1			
Q12	Same as Q1			
Q13	TRANSISTOR, 2N4393	48-84749K33	101417	3
Q14	Same as Q13			
Q15	Same as Q3			
Q16	Same as Q1			
Q17	Same as Q13			
Q18	Same as Q1			
Q19	Same as Q1			
Q20	TRANSISTOR, 2N3906	48-83358H10	101378	2
Q21	TRANSISTOR, 2N3904	48-84066A57	101377	2
Q22	Same as Q21			
Q23	Same as Q20			
Q24	TRANSISTOR, W/HD WR	48-82393K14	101405	1
Q25	TRANSISTOR, 2N5190	48-84204D15	101394	1
Q26	Same as Q1			
Q27	TRANSISTOR, 2N3638	48-82699E64	101360	1
Q28	TRANSISTOR, 2N3643	48-83227D02	101358	1
Q29	Same as Q3			
Q30	TRANSISTOR, 2N3640		101357	1
R1	RESISTOR, 1 K 1/4W, 5%	6-124A49	101569	8
R2	RESISTOR, 680 Ω 1/4W, 5%	6-124A45	101669	2
R3	RESISTOR, 4.7K 1/4W, 5%	6-124A65	101598	3
R4	RESISTOR, 10K 1/4W, 5%	6-124A73	101570	22
R5	Same as R4			
R6	RESISTOR, 220Ω 1/4W, 5%	6-124A33	101566	2
R7	RESISTOR, Pot 20K Top Adj	18-83739K38	102299	2
R8	RESISTOR, 560Ω 1/4W, 5%	6-124A43	101583	3
R9	Same as R1			
R10	Same as R6			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION: ADAM P.C. ASSEMBLY #1-83739K14 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
R11	RESISTOR, 270K, 1/4W, 5%	6-124B08	101769	2
R12	RESISTOR, 560K, 1/4W, 5%	6-124A43	101687	1
R13	RESISTOR, 2.7K, 1/4W, 5%	6-124A61	101599	8
R14	RESISTOR, 22K, 1/4W, 5%	6-124A81	1-1572	13
R15	RESISTOR, 330Ω, 1/4W, 5%	6-185A37	101536	7
R16	Same as R14			
R17	Same as R13			
R18	RESISTOR, 56Ω 1/4W, 5%	6-124A19	101735	4
R19	Same as R8			
R20	Same as R14			
R21	RESISTOR, 5.6K, 1/4W, 5%	6-124A67	101584	3
R22	Same as R18			
R23	Same as R14			
R24	RESISTOR, 2.2K 1/4W, 5%	6-124A57	101562	5
R25	Same as R4			
R26	RESISTOR, 39K TM 1/8W	6-185B98	103192	1
R27	Same as R4			
R28	Same as R11			
R29	RESISTOR, 82K 1/4W, 5%	6-124A95	101578	1
R30	Same as R14			
R31	RESISTOR, 47K 1/4W, 5%	6-124A89	101574	12
R32	RESISTOR, 150K 1/4W, 5%	6-124B02	101604	2
R33	RESISTOR, Pot 5K Top Adj	18-84204D93	102099	2
R34	Same as R15			
R35	Same as R4			
R36	RESISTOR, 100Ω 1/4W, 5%	6-124A25	101609	1
R37	Same as R15			
R38	Same as R4			
R39	RESISTOR, 100K 1/4W, 5%	6-124A97	101558	24
R40	RESISTOR, 120K 1/4W, 5%	6-124A99	101580	2
R41	Same as R15			
R42	Same as R8			
R43	RESISTOR, 15Ω 1/4W, 5%	6-124A05	1-1764	1
R44	RESISTOR, 2.7K 1/8W, 5%		101803	1
R45	RESISTOR, Pot 500Ω, Top Adj	18-84205D05	102163	2
R46	Same as R13			
R47	Same as R14			
R48	Same as R15			
R49	RESISTOR, 47Ω 1/4W, 5%	6-124A17	101560	4
R50	Same as R14			
R51	RESISTOR, 330Ω 1/8W, 5%	6-185A37	1-1704	1
R52	RESISTOR, 270Ω 1/4W, 5%	6-124A35	1-1542	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION ADAM P.C. ASSEMBLY #1-83739K14 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
R53	Same as R14			
R54	RESISTOR, 39K 1/4W, 5%	6-124A87	101561	1
R55	RESISTOR, 4.7Ω 1/4W, 5%	6-124A65	101796	1
R56	RESISTOR, 3.9K 1/4W, 5%	6-124A63	101601	1
R57	Same as R15			
R58	Same as R31			
R59	RESISTOR, 470Ω 1/4W, 5%	6-124A41	101625	2
R60	Same as R59			
R61	RESISTOR, 470K 1/4W, 5%	6-124B14	101630	3
R62	RESISTOR, 27K 1/4W, 5%	6-124A83	101587	1
R63	Same as R31			
R64	Same as R61			
R65	Same as R21			
R66	Same as R39			
R67	Same as R39			
R68	RESISTOR, 750Ω 1/4W, 5%	6-124A46	101689	2
R69	Same as R45			
R70	Same as R68			
R71	Same as R4			
R72	RESISTOR, 1.2K 1/4W, 5%	6-124A51	101581	1
R73	Same as R1			
R74	RESISTOR, 22Ω 1/4W, 5%	6-124A09	101696	1
R75	Same as R4			
R76	Same as R39			
R77	Same as R40			
R78	Same as R39			
R79	Same as R1			
R80	Same as R15			
R81	Same as R4			
R82	Same as R4			
R83	Same as R4			
R84	Same as R13			
R85	Same as R61			
R86	RESISTOR, 680K 1/4W, 5%	6-124B18	101675	1
R87	RESISTOR, 1.8K 1/4W, 5%	6-124A55	101602	1
R88	Same as R14			
R89	Same as R24			
R90	Same as R14			
R91	Same as R39			
R92	Same as R1			
R93	RESISTOR, 1M 1/4W, 5%	6-124B22	101605	3
R94	Same as R39			
R95	RESISTOR, Pot 100K, Top Adj	18-84209D78	102298	4

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION ADAM P.C. ASSEMBLY #1-83739K14 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
R96	Same as R39			
R97	Same as R39			
R98	RESISTOR, 33K 1/4W, 5%	6-124A85	101576	3
R99	Same as R98			
R100	Same as R39			
R101	Same as R98			
R102	Same as R39			
R103	Same as R14			
R104	RESISTOR, 15K, 1/4W, 5%	6-124A77	101552	1
R105	Same as R31			
R106	Same as R4			
R107	Same as R93			
R108	Same as R39			
R109	RESISTOR, 220K 1/4W, 5%	6-124B06	101610	1
R110	Same as R39			
R111	Same as R39			
R112	Same as R32			
R113	Same as R31			
R114	Same as R39			
R115	Same as R7			
R116	Same as R4			
R117	Same as R24			
R118	Same as R1			
R119	Same as R39			
R120	RESISTOR, 180Ω 1/4W, 5%	6-124A31	101668	2
R121	Same as R120			
R122	Same as R4			
R123	Same as R4			
R124	Same as R31			
R125	Same as R14			
R126	Same as R95			
R127	RESISTOR, 2.7M 1/4W, 5%		101621	1
R128	Same as R1			
R129	Same as R4			
R130	Same as R3			
R131	RESISTOR, 10K .12W, 1%		102098	2
R132	RESISTOR, 2.2 M 1/4W, 5%	6-124B29	101618	5
R133	Same as R131			
R134	Same as R3			
R135	SAme as R4			
R136	Same as R4			
R137	Same as R49			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION ADAM P.C. ASSEMBLY #1-38379K14 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
R138	Same as R31			
R139	Same as R31			
R140	RESISTOR, 12K 1/4W, 5%	6-124A75	101565	2
R141	Same as R39			
R142	Same as R1			
R143	RESISTOR, 10M 1/4W, 5%	6-124B46	101564	2
R144	Same as R39			
R145	Same as R31			
R146	Same as R2			
R147	RESISTOR, Pot 1K, Top Adj	18-83739K49	103116	2
R148	Same as R147			
R149	RESISOR, 8.2K 1/4W, 5%	6-124A71	101595	1
R150	Same as R13			
R151	Same as R132			
R152	RESISTOR, 2K 1/4W, 5%	6-124A56	101553	1
R153	RESISTOR, 1.5K 1/4W, 5%	6-124A53	101577	1
R154	Same as R132			
R155	Same as R39			
R156	Same as R4			
R157	Same as R132			
R158	Same as R31			
R159	Same as R4			
R160	Same as R31			
R161	Same as R14			
R162	Same as R95			
R163	RESISTOR, 68K 1/4W, 5%	6-124A93	101597	1
R164	Same as R31			
R165	Same as R4			
R166	Same as R143			
R167	RESISTOR, 5.1M 1/4W, 5%		101692	1
R168	Same as R39			
R169	Same as R93			
R170	RESISTOR, 6.65K .12W, 1% MF	6-84205D20	102094	1
R171	RESISTOR, 2.32K .12W, 1% MF	6-84205D21	102096	1
R172	RESISTOR, 806Ω .12W, 1% MF	6-10621B85	103194	1
R173	RESISTOR, 200Ω .12W, 1% MF	6-10621B27	103195	1
R174	Same as R4			
R175	Same as R39			
R176	Same as R21			
R177	Same as R132			
R178	Same as R39			
R179	Same as R39			
R180	Same as R24			

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION ADAM P.C. ASSEMBLY #1-83739K14 CONTD

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
R181	Same as R49			
R182	Same as R18			
R183	Same as R39			
R184	Same as R24			
R185	Same as R18			
R186	Same as R49			
R187	Same as R13			
R188	RESISTOR, 75K 1/4W, 5%	6-124A94	101613	1
R189	RESISTOR, 30K 1/4W, 5%		101549	1
R190	Same as R33			
R191	Same as R13			
R192	RESISTOR, 51K 1/4W, 5%	6-124A90	101590	1
R193	Same as R95			
R194	RESISTOR, 110K 1/4W, 5%		101617	1
R195	Same as R13			
R196	Same as R140			
TP1 thru TP17	Test Point	9-83739K67	100565	17
U1	INTEGRATED CIRCUIT, CA3012	51-83739K24	025703	1
U2	INTEGRATED CIRCUIT, SN7474N	51-84309A77	025241	1
U3	INTEGRATED CIRCUIT, CA3018	51-84320A07	025720	1
U4	INTEGRATED CIRCUIT, LM301A	51-84204D30	025745	2
U5	INTEGRATED CIRCUIT, LM4250CH	51-83739K22	045258	5
U6	Same as U5			
U7	Same as U5			
U8	Same as U5			
U9	Same as U4			
U10	Same as U5			
U11	INTEGRATED CIRCUIT, MC14013CP	51-83739K25	103199	1
U12	INTEGRATED CIRCUIT MC14528CP	51-82822F35	045289	1
U13	INTEGRATED CIRCUTI LM324N	51-84320A80	103198	2
U14	Same as U13			
U15	INTEGRATED CIRCUIT DC4010AE	51-82822F07	045285	1
U16	INTEGRATED CIRCUIT RC4194D	51-83739K26	045255	1
U17	INTEGRATED CIRCUIT, LM75453		045291	1
	SWAGE, Terminal BIF	29-84209D51	100482	41
	SCREW, 4-40 x 3/8 PHM	3-80311A22	10062606	2
	WASHER, #4 Flat	4-7607	100703	2
	NUT, 4-40, Kep	2-80311A16	100941	2

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION OSCILLATOR POWER INVERTER P.C. ASSEMBLY #1-82822K28

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C1	CAPACITOR, 1 µF, 25V Disc	21-84208D96	100176	1
C2	CAPACITOR, .01 µF, 500V Disc	21-84309A30	100075	1
C3	CAPACITOR, .005 µF, 1.4 kV Disc	23-82393K15	102823	1
C4	CAPACITOR, 10 µF, 20V Tant	23-82783B27	100063	1
C5	CAPACITOR, .02 µF, 500V Disc	21-401029	106489	1
C6	CAPACITOR, 100 µF, 10V Tant	23-864366	100119	2
C7	CAPACITOR, .1 µF, 50V Disc	21-84209D49	100178	1
C8	Same as C6			
CR1	DIODE, 1N4933	48-80313A46	100450	1
L1	INDUCTOR	24-80313A38	055525	1
Q1	TRANSISTOR, 2N3646	48-84305A20	101369	2
Q2	Same as Q1			
Q3	P/O shipping assembly			
R1	RESISTOR, 270Ω 1/4W, 5%	6-124A35	101542	1
R2	RESISTOR, 4.7K 1/4W, 5%	6-124A65	101598	1
R3	RESISTOR, 820Ω 1/4W, 5%	6-124A47	101567	1
R4	RESISTOR, 100Ω 1W, 5%	6-5739	101856	1
R5	RESISTOR, 47Ω 1/4W, 5%	6-124A17	101560	1
R6	RESISTOR, 100Ω 1/4W, 5%	6-125A25	101609	1
U1	INTEGRATED CIRCUIT, MC3380	51-80313A47	103379	1
VR1	ZENER DIODE, 1N753A	48-84302A09	100387	1
VR2	ZENER DIODE, 1N968B	48-83624E04	100409	1
	TERMINAL	29-84209D51	100409	7
	SCREW, 8-32 X 1, NYL	3-80313A39	103374	1
	NUT, #8, NYL	2-80313A40	103375	1
	WASHER, Flat .187ID, NYL	4-80313A41	100783	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION INVERTER P.C. ASSEMBLY #1-82822K29

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
C1	CAPACITOR, 150 µF, 15V Tant	23-83739K52	100209	1
C2	CAPACITOR, 1 µF, 35V Tant	23-82783B26	100082	1
C3	CAPACITOR, 1 µF, 25V Disc	21-84208D96	100208	4
C4	CAPACITOR, 100 µF, 20V Tant	23-83819K65	100208	2
C5	Same as C4			
C6	Same as C3			
C7	Same as C3			
C8	Same as C3			
C9	CAPACITOR, .01 µF, 100V Disc	21-84309A25	100103	1
C10	CAPACITOR, 22 µF, 15V Tant	23-827383B32	100125	1
CR1	DIODE, 1N4005	48-82466H18	100413	2
CR2	Same as CR1			
CR3	DIODE, 1N4151	48-84309A57	100385	2
CR4	Same as CR3			
L1	INDUCTOR, 100 µH, Line Filter	24-82393K10	101328	1
Q1	TRANSISTOR, P/O chassis assembly			
Q2	TRANSISTOR, 2N3646	48-84305A20	101369	3
Q3	Same as Q2			
Q4	Same as Q2			
Q5	TRANSISTOR, MPSA12	48-84209D67	101396	1
Q6	TRANSISTOR, P/O chassis assembly			
R1	RESISTOR, 100Ω 1/4W, 5%	6-124A25	101609	1
R2	RESISTOR, 10K 1/4W, 5%	6-124A73	101570	1
R3	RESISTOR, 22K 1/4W, 5%	6-124A81	101572	4
R4	Same as R3			
R5	RESISTOR, 1K, POT 4T Top Adj	18-83739K49	103116	1
R6	RESISTOR, 4.7K 1/4W, 5%	6-124A65	101598	1
R7	RESISTOR, 1.5K 1/4W, 5%	6-124A53	101577	1
R8	Same as R3			
R9	Same as R3			
R10	RESISTOR, 1K 1/4W, 5%	6-124A49	101569	2
R11	Same as R10			
R12	RESISTOR, 39Ω 1/4W, 5%	6-124E15	101733	1
U1	INTEGRATED CIRCUIT INVERTER	1-84209D92	04562261	1
U2	INTEGRATED CIRCUIT, LM723CN	51-82554F38	025761	1
VR1	ZENER DIODE, 1N967B	48-83624E58	100404	1
VR2	ZENER DIODE, 1N957B	48-818459	100416	1
	TERMINAL	29-84209D51	100482	5
	TERMINAL	29-84209D52	100508	10
	WASHER, .281 X .031, NYL	4-80313A42	100815	2

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION BATTERY CHARGER P.C. ASSEMBLY #1-82822K30

REF. #	DESCRIPTION	MOTOROLA PART NO.	S–D PART NO.	QTY PER ASSY
CR1	DIODE, 30S05	48-83739K36	103252	1
CR2	DIODE, 1N4151	48-84209A57	100385	1
Q1	TRANSISTOR, MPSA65	48-80313A48	101404	1
Q3	TRANSISTOR, 2N3904	48-84D66A57	101377	2
Q4	Same as Q3			
R1	RESISTOR, 1K 1/4W, 5%	6-124A49	101569	1
R2	RESISTOR, 10Ω 1/4W, 5%	6-124A01	101557	1
R3	RESISTOR, 50Ω POT 1T Top Adj	18-80313A43	101906	1
R4	RESISTOR, 390Ω 1/4W, 5%	6-124A39	101592	4
R5	RESISTOR, 120Ω 1W, 5%	6-126A27	101839	1
R6	RESISTOR, 1Ω 2W, Wire Wound	17-855604	102214	1
R7	Same as R4			
R8	RESISTOR, 510Ω 1/4W, 5%	6-124A42	101616	1
R9	Same as R4			
R10	Same as R4			
VR1	ZENER DIODE, 1N957B	48-818459	100416	1
	TERMINAL	29-84209D52	100508	6
	SPACER SWAGE, 4-40 X 1/8	29-80311A50	100492	2

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION EXT DC SUPPLY CHASSIS ASSEMBLY #1-82822K31

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
Q1	TRANSISTOR, MJE2955	48-83819K47	106583	2
Q2	Same as Q1			
	CHASSIS, External DC Supply (Stacked)	1-82822K32	055045	1
	INVERTER, P.C. Assembly Sep. P/L	1-82822K29	05543701	1
	SCREW, 4-40 X 9/16 PHMS	3-80311A20	100835	1
	CABLE, Tie Anchore	42-80313A44	102747	1
	SCREW, 4-40 X 3/8 PHMS	3-80311A22	10062606	6
	WASHER, #4 Flat	4-7607	100703	5
	WASHER, #4 Split	4-114583	100711	5
	NUT, 4-40 Hex	2-7019	100707	1
	DIODE, MR1120R (Hardware Incl)	48-84250C75	100424	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION 6V BATTERY PACK ASSEMBLY #1-82822K33

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
Q1	TRANSISTOR, MJE2955	48-83819K47	106583	2
Q2	TRANSISTOR, 2N5193	48-82393K14	101405	1
Q6	Same as Q1			
	BATTERY CHASSIS (Stacked)	1-82822K34	055445	1
	BATTERY	60-83739K69	100042	2
	BATTERY CLAMP, Front Assembly	1-83839K17	04561401	1
	BATTERY CLAMP, Rear Assembly	1-83839K18	04561501	1
	INVERTER, P.C. Assembly	1-82822K29	05543701	1
	BATTERY CHARGER, P.C. Assembly	1-82822K30	05543601	1
	SCREW, 4-40 X 3/8 FHMS	3-80311A90	10072006	5
	NUT, 4-40 Hex	2-7019	100707	4
	SCREW, 4-40 X 5/16	3-80311A21	10062605	12
	WASHER, #4 Split	4-114583	100711	13
	WASHER, #4 Flat	4-7607	100703	5
	SCREW, 4-40 X 9/16 PHMS	3-80311A20	100835	1
	CABLE, Tie Anchor #4 Mtg	42-80313A44	102747	1
	CABLE, Tie Anchor #6 Mtg	42-80313A45	102748	2
	WASHER, #6 Split	4-7669	100712	2
	SCREW, 6-32 X 5/16 PHM	3-80311A23	10063205	2
	CABLE TIE	42-84066A60	100753	

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION INSTALLATION & SHIPPING ASSY 6V BATTERY PACK

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
	BATTERY PACK, Assembly Opt 06	1-82822K33	055457	1
	SPACER, Male-Female 6-32 X 2/3	43-80313A50	100968	8
	SCREW, 6-32 X 3/8 PHM	3-80311A24	10063206	9
	WASHER, #6 Flat	4-1720	100662	5
	WASHER, #6 Split	4-7669	100712	9
	WASHER, Fibre	4-10058A05	100619	4
	CABLE, Clamp 3/16	42-82143C01	102931	1
	CABLE TIE	42-84066A60	100753	12

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION INSTALLATION & SHIPPING ASSY EXTERNAL DC SUPPLY 05

REF. #	DESCRIPTION	MOTOROLA PART NO.	S–D PART NO.	QTY PER ASSY
	Nut, 6-32 Hex	2-7005	100706	2
	WASHER, Split lock #6	4-7669	100712	1
	LUG, Solder #6	29-129907	100486	1
	WASHER, #6 Flat	4-1720	100704	2
	WASHER, #6 Nylon Shldr	4-868830	102893	2
	SCREW, 6-32 X .500	3-80311A19	10063208	2
	INSULATOR mica	14-865875	100551	1
	OSCILLATOR, Power Inverter, P.C. Assy	1-82822K28	05522801	1
	OPTION 07, Assembly	SLN6422A	055475	1
Q3	TRANSISTOR, UPT U21	48-80313A49	103376	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION INSTALLATION & SHIPPING ASSY EXTERNAL DC SUPPLY 07

REF. #	DESCRIPTION	MOTOROLA PART NO.	S-D PART NO.	QTY PER ASSY
	CONNECTOR, 2 pin Female		102146	1
	CONNECTOR, 2 pin Male		103145	1
	NUT, 4-40 kep		100941	2
	SPACER, Connector		A055366	1
	SCREW, 4-40 3/4 PHMS		10062612	2
	FUSE, 4A 3AG		103075	1
	HOLDER, Fuse	9-82083C02	102409	1
	TIE, Cable	42-84066A60	100753	12
	CLAMP, Cable 3/16	42-82143C01	102931	1
	WASHER, #6 Flat	4-1720	100662	1
	WASHER, Fibre	4-10058A05	100619	4
	SCREW, 6-32 3/8 PHMS	3-80311A24	10063206	5
	WASHER, #6 Split	4-7669	100712	5
	SPACER, 6-32 3/8		103394	4
	KIT, Wiring Opt. 07	A055474	A055474	1
	EXTERNAL DC POWER SUPPLY, Assy Opt. 07	SLN6422A	C055473	1

REPLACEABLE PARTS LIST

EQUIPMENT/ASSEMBLY DESIGNATION INSTALLATION & SHIPPING ASSY DEVIATION METER

REF. #	DESCRIPTION	MOTOROLA PART NO.	S–D PART NO.	QTY PER ASSY
	SCREW, 6-32 X 1-2 PHMS	14-86587	10063208	1
	WASHER, #6 Flat	4-1720	100704	1
	CLAMP, Cable 1/8"		102831	1
	CLAMP, Cable		100716	1
	SPEAKER, 3.2Ω		103251	1
	KIT, wiring		B05522301	1
	DEVIATION METER, Assy	SLN6408A	D005096	1

CHAPTER 7
DRAWINGS

7.1 INTRODUCTION

This chapter contains the drawings for all configurations of the Counter/Deviation Meter. They are arranged with the Counter assembly drawings, followed by the "A" numbered assemblies. The Deviation Meter assembly drawings follow the Counter drawings.

PAGE		TITLE
7-2	055069,	Counter Universal Chassis Assembly
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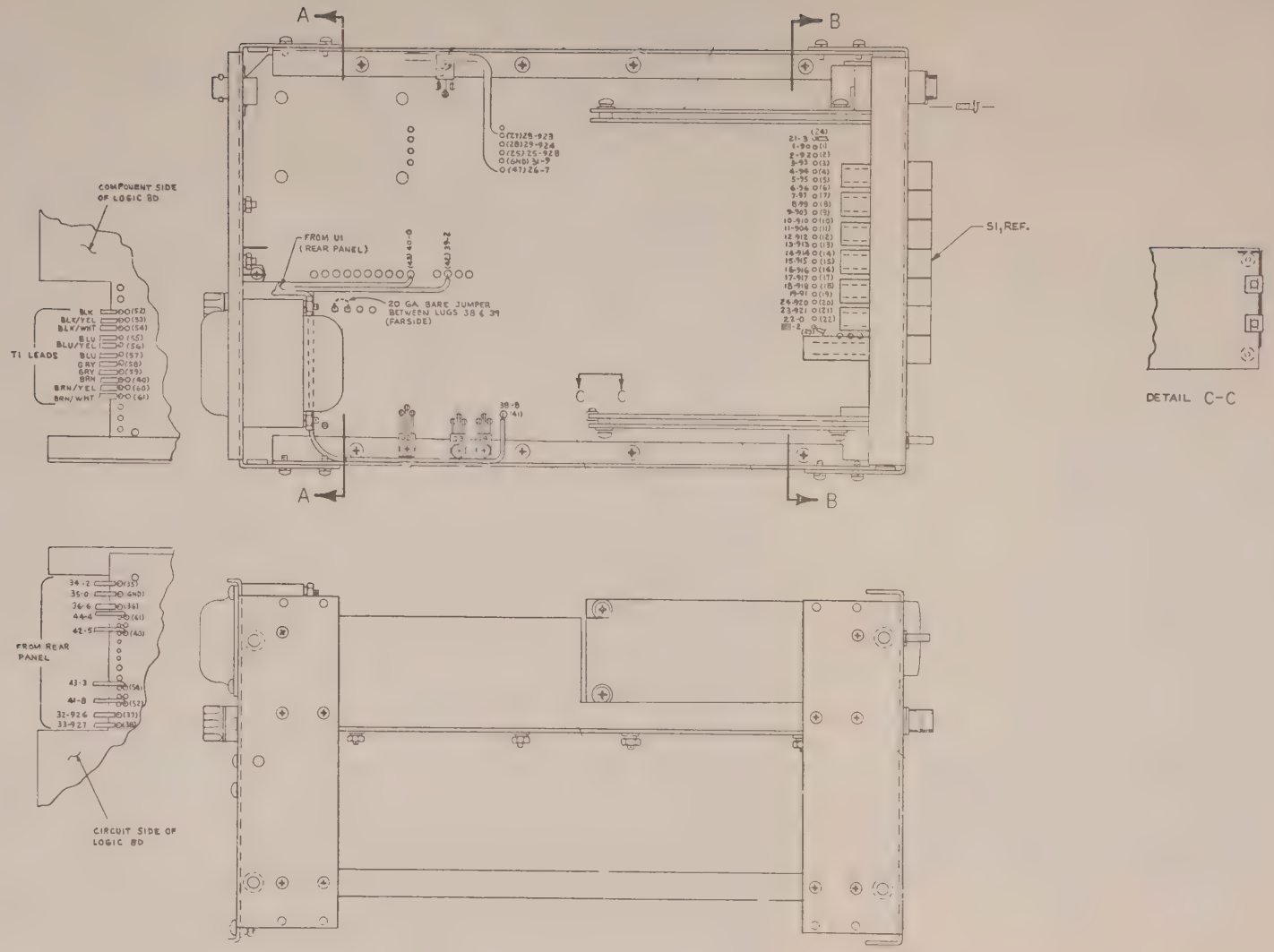
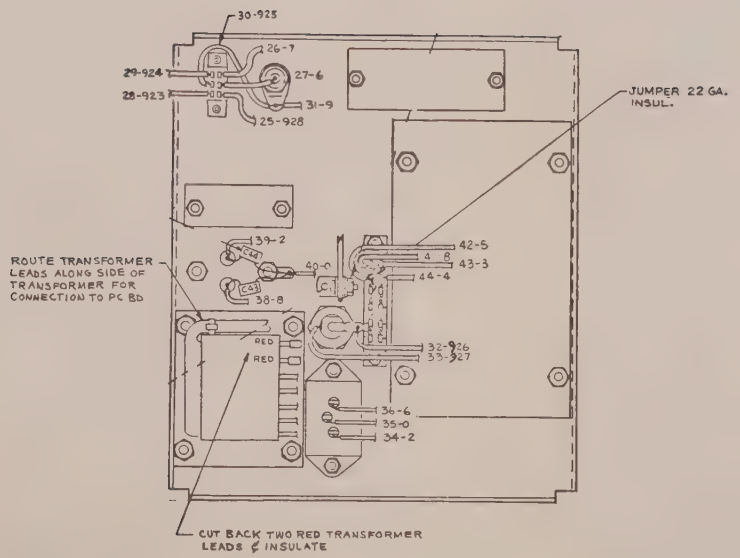
7-7	7-05377001,	Logic Assembly, Schematic Diagram
7-9	7-05528201,	Readout Assembly, Schematic Diagram
7-10	1-83739K05,	Readout Assembly
7-11	7-05311301,	Amplifier Assembly, Schematic Diagram
7-12	1-83739K03,	Amplifier Assembly
7-13	7-05349901,	Prescaler Assembly, Schematic Diagram
7-14	1-83839K02,	Prescaler Assembly
7-15	1-83739K01,	Oscillator, Assembly and Schematic
7-16	1-83739K13,	Oscillator Assembly, Option 11, 12, 13
7-17	7-055703,	Oscillator Assembly, Option 11,12,13 Schematic Diagram
7-18	7-055386,	External DC Option 05, Schematic Diagram
7-19	SLN-6422A,	External DC Option 07, Schematic Diagram
7-20	SLN-6421A,	Battery Pack Option 06, Schematic Diagram
7-21	1-82822K29,	Inverter Assembly
7-22	1-82822K33,	6-Volt Battery Pack Assembly
7-23	SLN-6408A,	Test Assembly, Deviation Meter
7-24	055254,	Installation Drawing and Shipping, Deviation Meter
7-25	1-83739K14,	Automatic Deviation Analysis Meter Assembly
7-26	7-05344101,	Automatic Deviation Analysis Meter, Schematic Diagram
7-28	055495,	Installation and Shipping Assembly Drawing, 6V Battery Pack
7-29	055487,	Installation and Shipping Assembly Drawing, External DC Supply, Option 05
7-30	055475,	Installation and Shipping Assembly Drawing, External DC Supply, Option 07

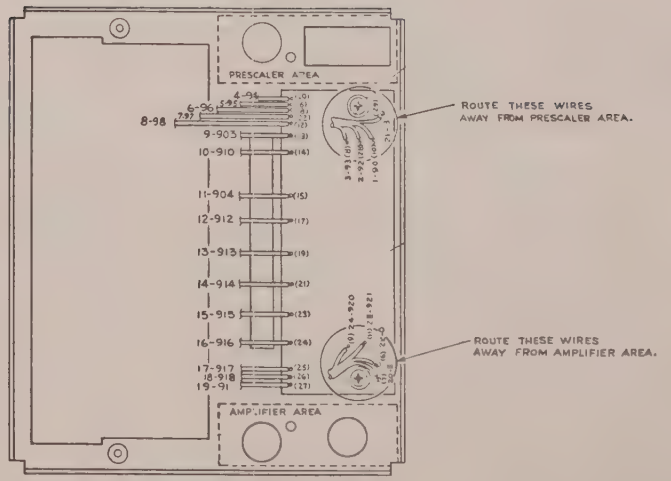


NOTES:
1. MAKE SURE PC. PLUG-IN'S ARE PROPERLY ALIGNED IN EDGE CONNECTORS BEFORE TIGHTENING RAILS TO SUB-PANEL, ALSO CHECK SWITCH POSITIONING.

COUNTER UNIVERSAL CHASSIS ASSEMBLY
#055069 SHEET 1 OF 2

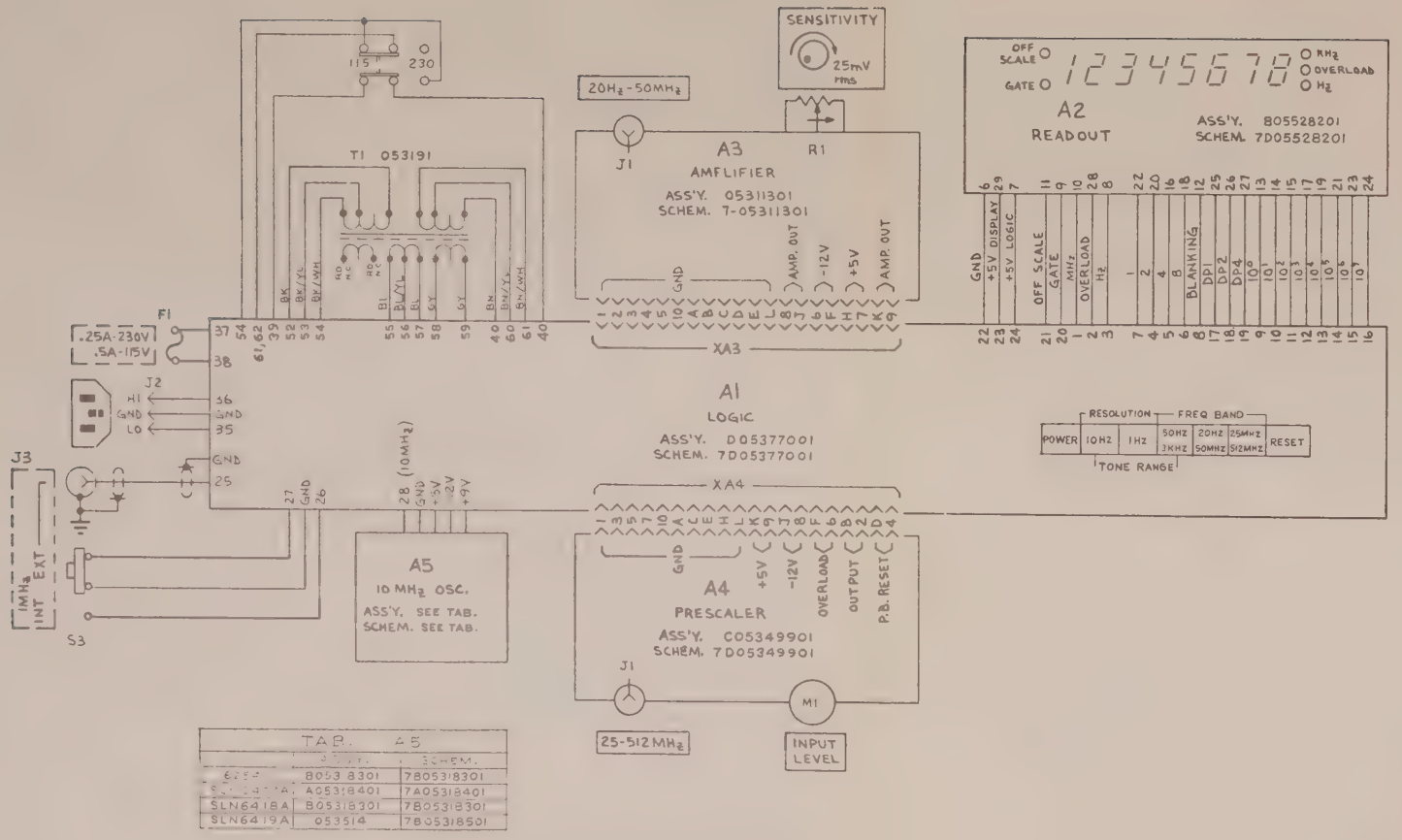


DETAIL A-A



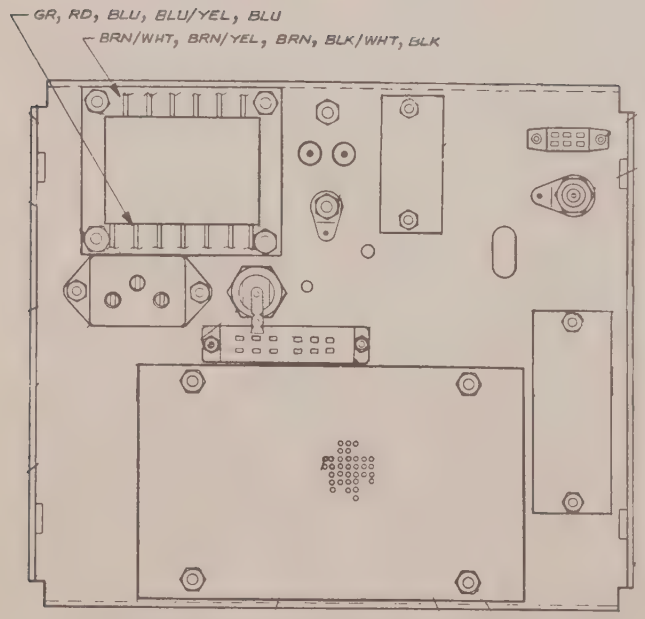
DETAIL B-B

COUNTER UNIVERSAL CHASSIS ASSEMBLY
#055069 (SHEET 2 OF 2)

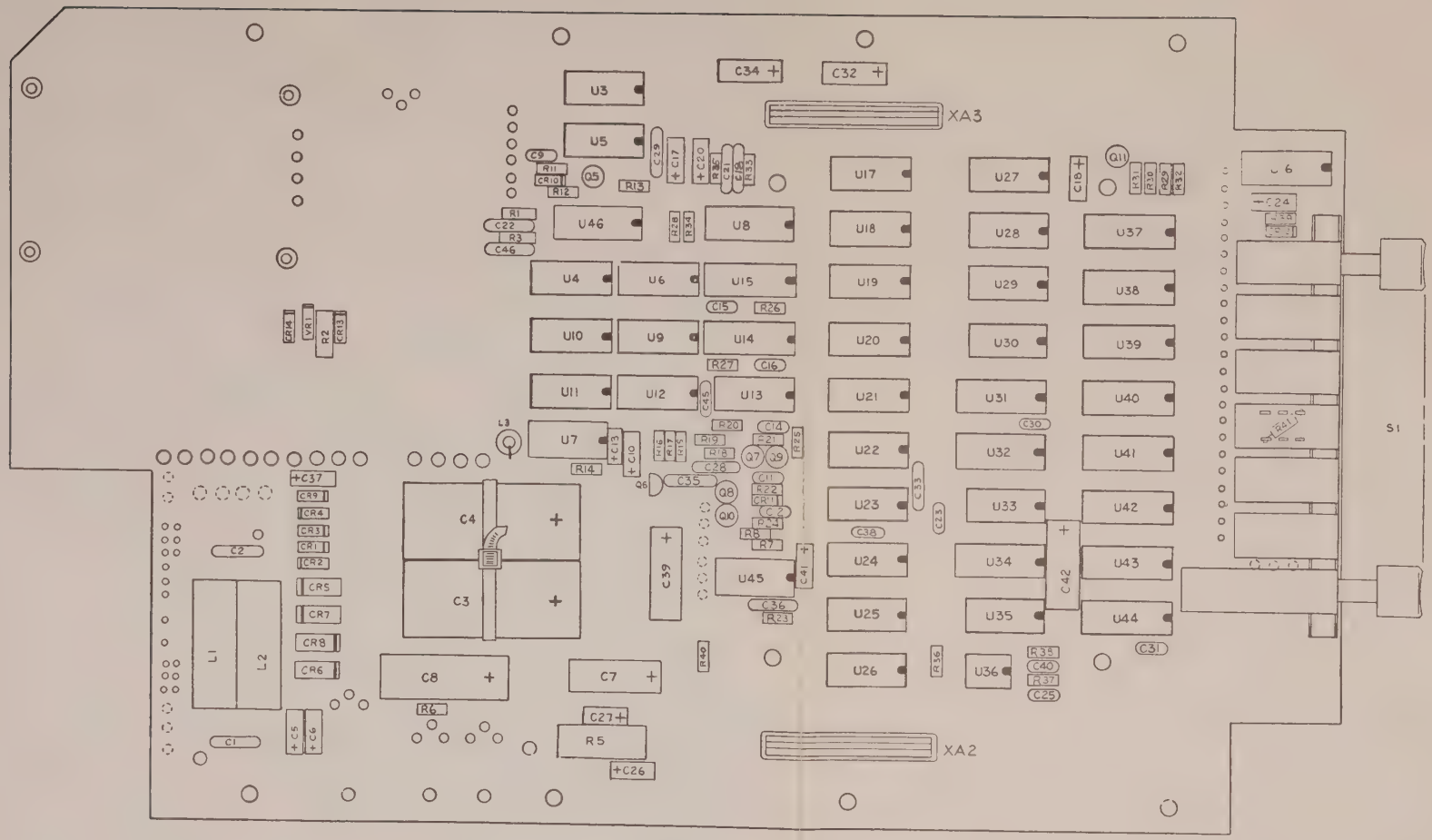


TAB. A5		
	ASS'Y.	SCHEM.
6254	B053 8301	7B05318301
SLN6418A	A05318401	7A05318401
SLN6418A	B05318301	7B05318301
SLN6419A	053514	7B05318501

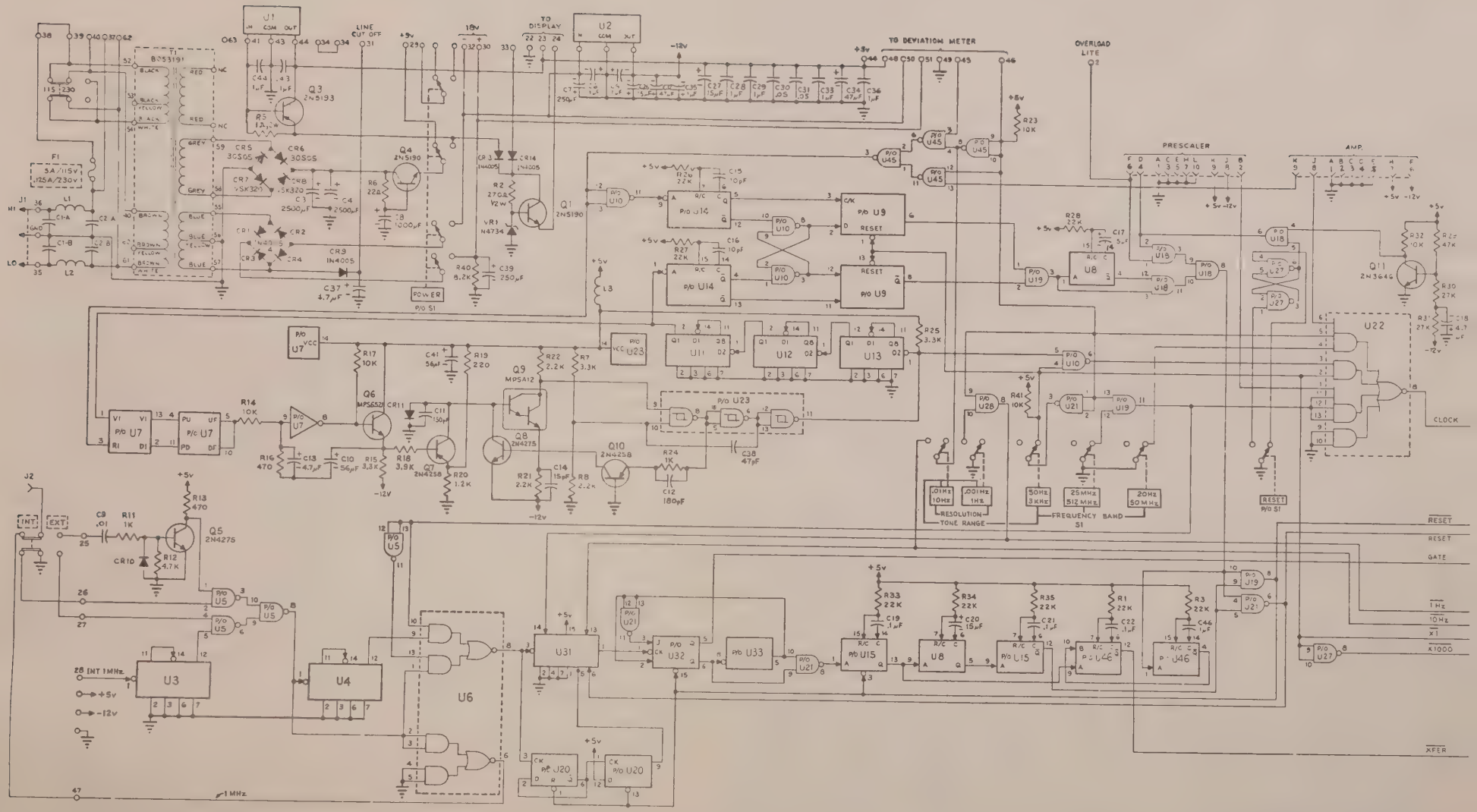
COUNTER, INTERCONNECT
BLOCK DIAGRAM #055073



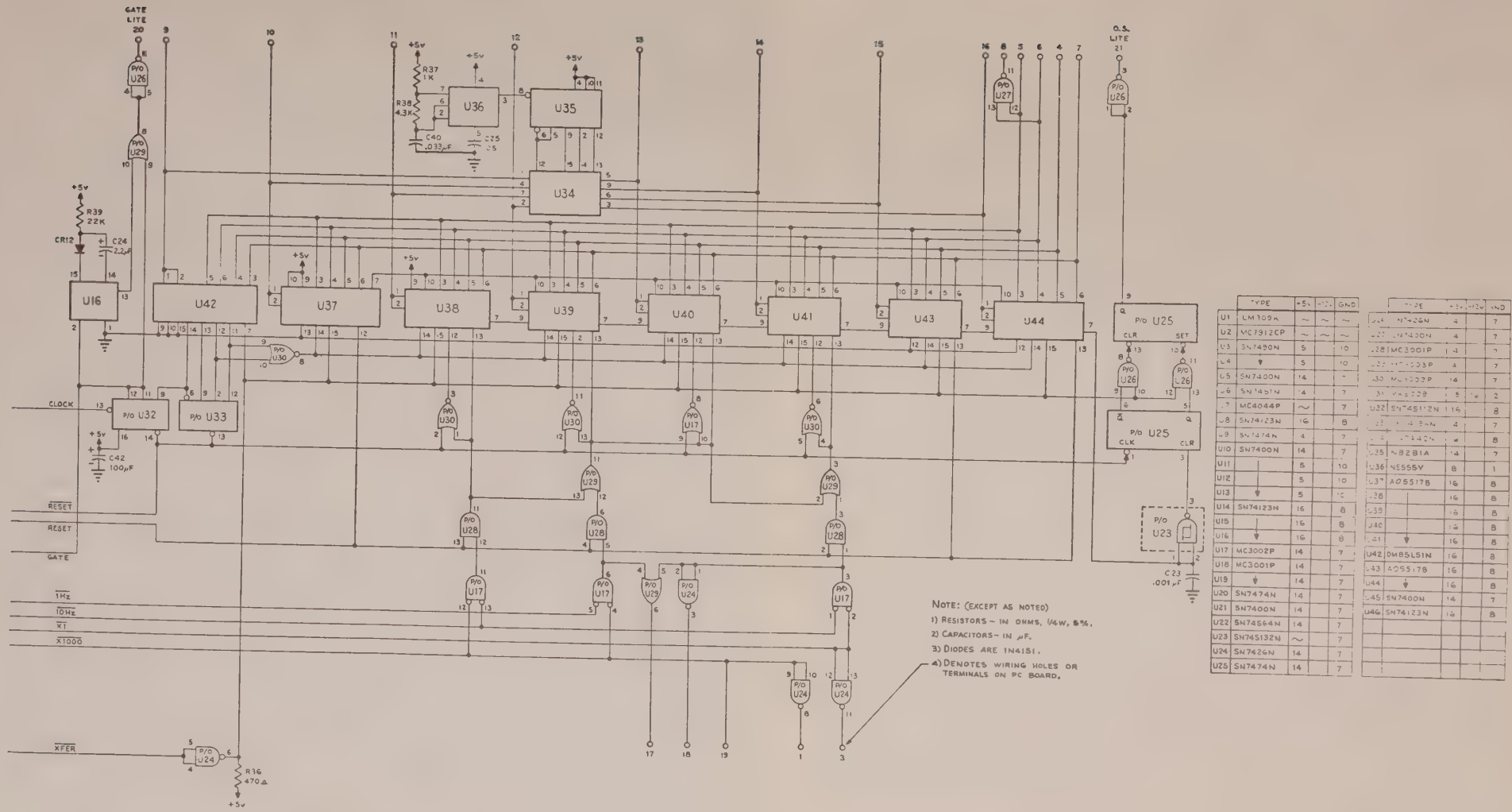
REAR PANEL ASSEMBLY #05368601



LOGIC ASSEMBLY #1-83739K04



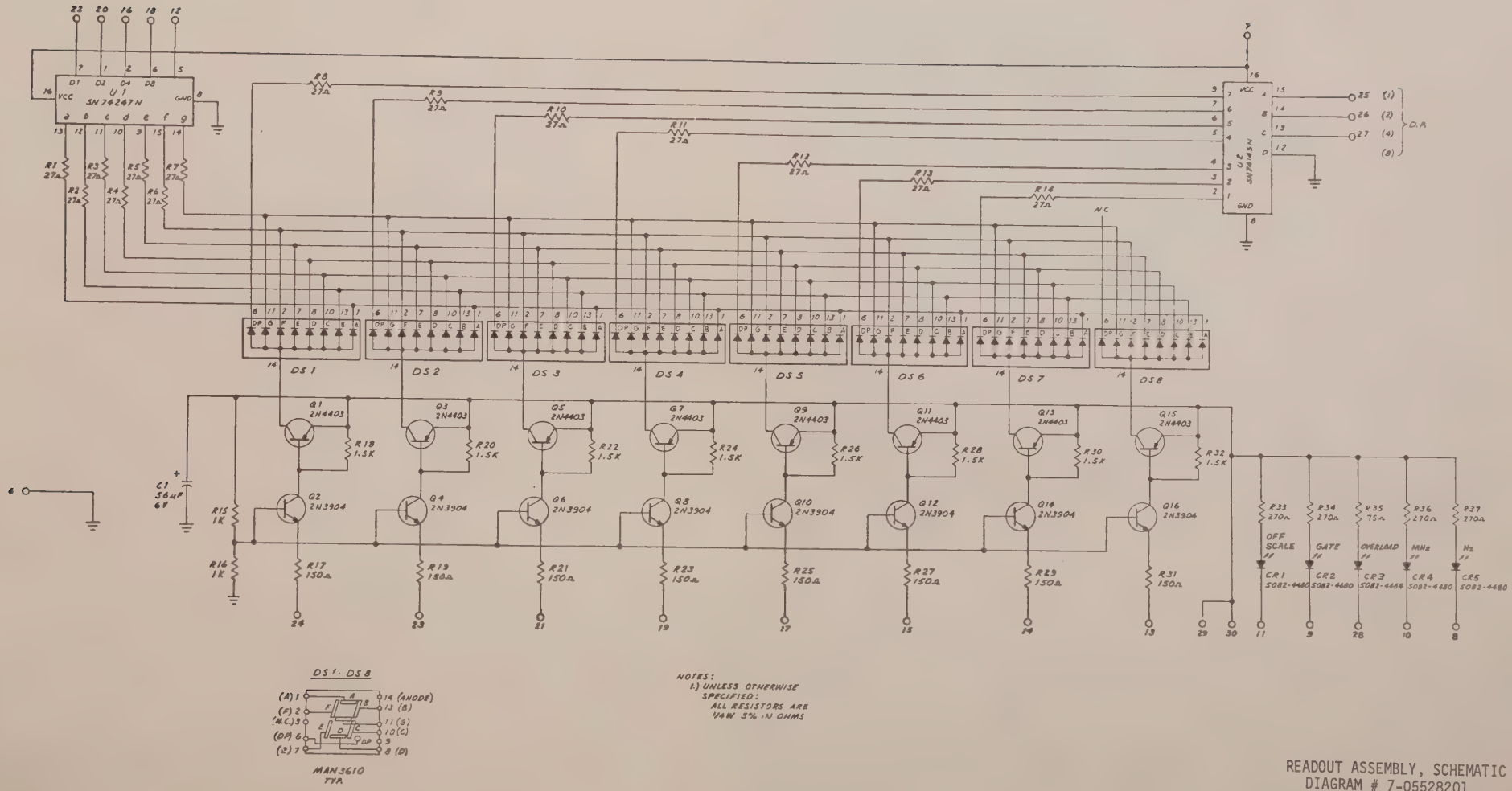
LOGIC ASSEMBLY SCHEMATIC
#7-05377001 (SHEET 1 OF 2)



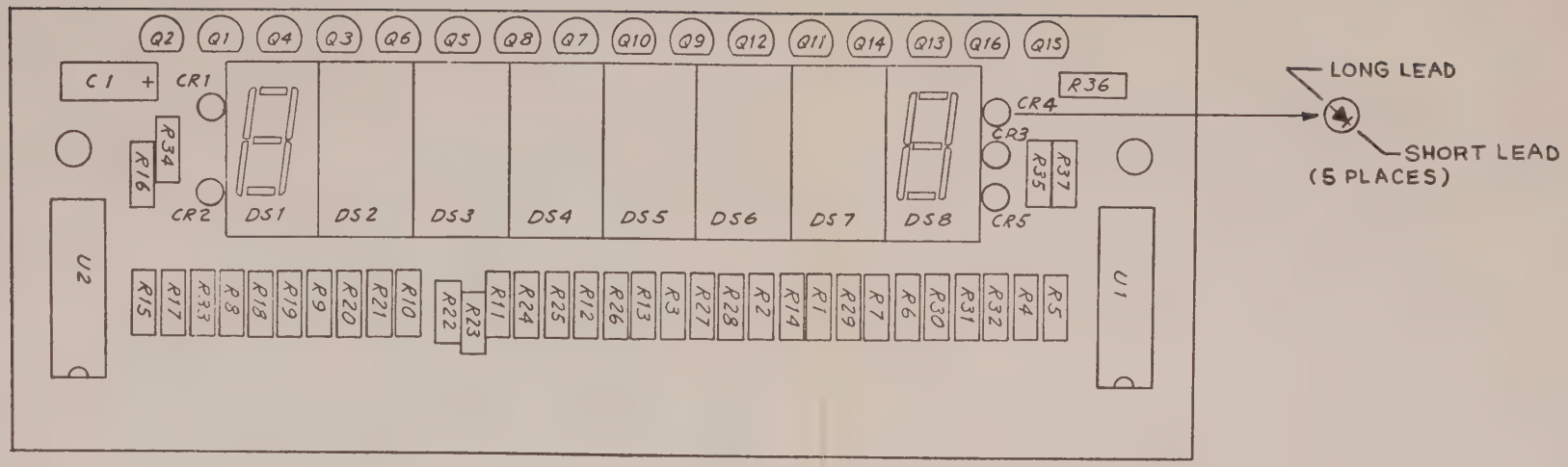
	TYPE	+5v	+12v	GND
U1	LM309K	~	~	~
U2	MC7912CP	~	~	~
U3	SN7430N	5		10
U4	↓	5		10
U5	SN7400N	14		7
U6	SN7451N	4		7
U7	MC4044P	~		7
U8	SN74123N	16		8
U9	SN7474N	4		7
U10	SN7400N	14		7
U11		5		10
U12		5		10
U13	↓	5		10
U14	SN74123N	16		8
U15		16		8
U16	↓	16		8
U17	MC3002P	14		7
U18	MC3001P	14		7
U19	↓	14		7
U20	SN7474N	14		7
U21	SN7400N	14		7
U22	SN74S64N	14		7
U23	SN74S132N	~		7
U24	SN7426N	14		7
U25	SN7474N	14		7

	TYPE	+5v	+12v	GND
U26	SN7426N	4		7
U27	SN7400N	4		7
U28	MC3001P	14		7
U29	SN7403P	4		7
U30	MC3003P	14		7
U31	[illegible]	5	[illegible]	2
U32	SN74S112N	16		8
U33	[illegible]	4		7
U34	SN7427N	4		8
U35	NE82B1A	14		7
U36	NE555V	8		1
U37	AD5517B	16		8
U38	↓	16		8
U39	↓	16		8
U40	↓	16		8
U41	↓	16		8
U42	DM85LS1N	16		8
U43	AD5517B	16		8
U44	↓	16		8
U45	SN7400N	14		7
U46	SN74123N	16		8

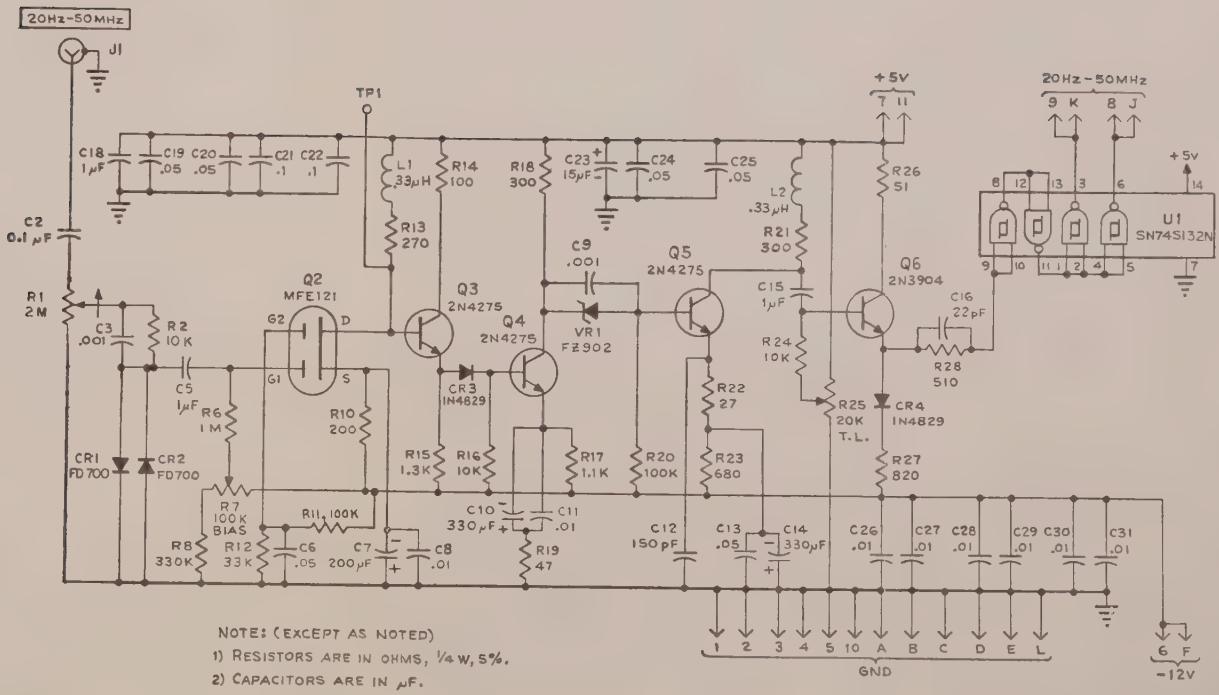
LOGIC ASSEMBLY SCHEMATIC
#7-05377001 (SHEET 2 OF 2)



READOUT ASSEMBLY, SCHEMATIC
DIAGRAM # 7-05528201

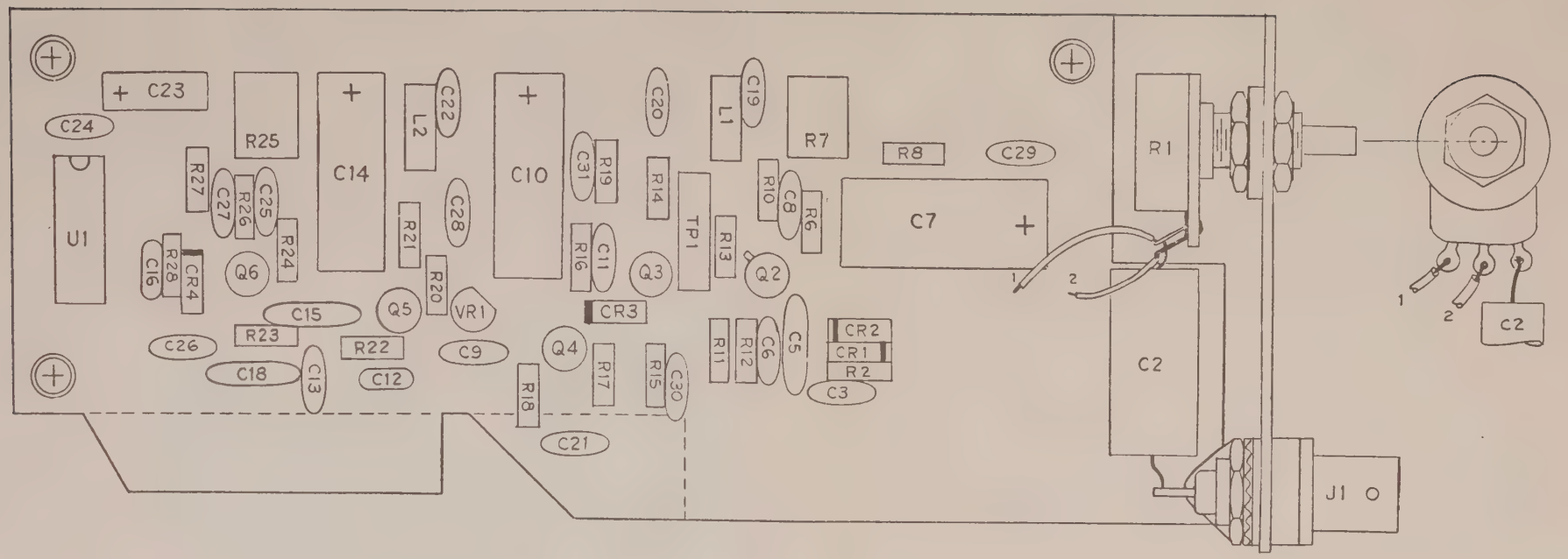


READOUT ASSEMBLY
#1-83739K05

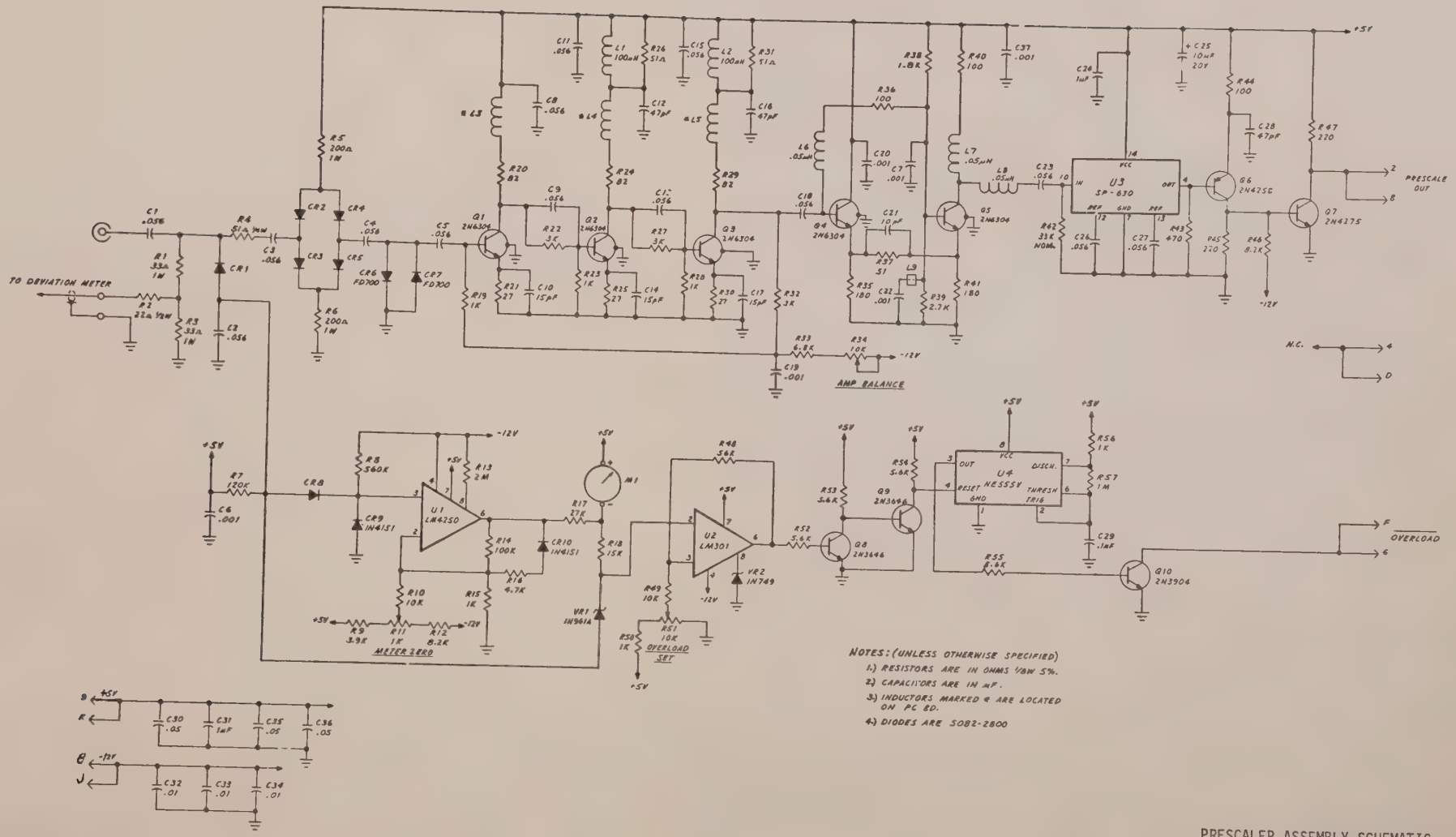


NOTE: (EXCEPT AS NOTED)
1) RESISTORS ARE IN OHMS, ¼ W, 5%.
2) CAPACITORS ARE IN μF.

AMPLIFIER ASSEMBLY, SCHEMATIC
DIAGRAM # 7-05311301



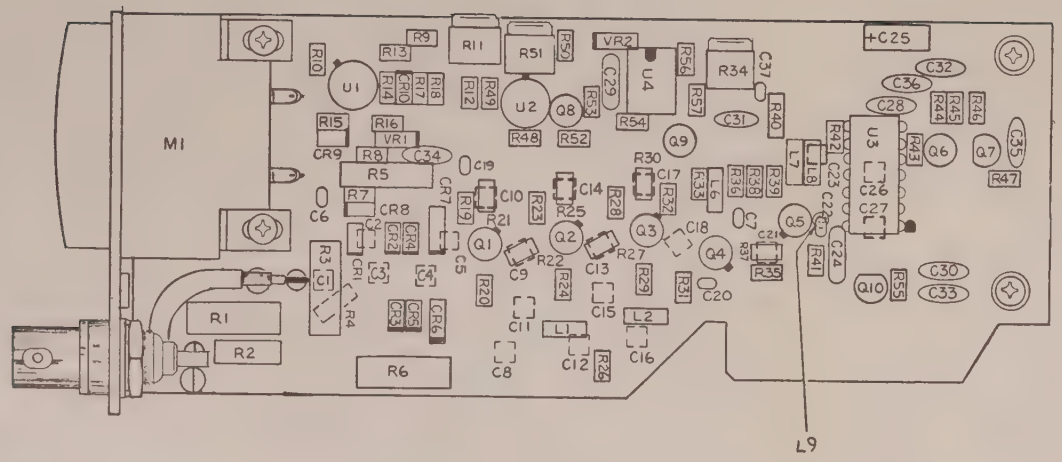
AMPLIFIER ASSEMBLY
#1-83739K03

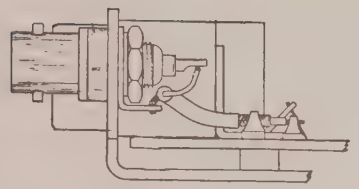


NOTES: (UNLESS OTHERWISE SPECIFIED)

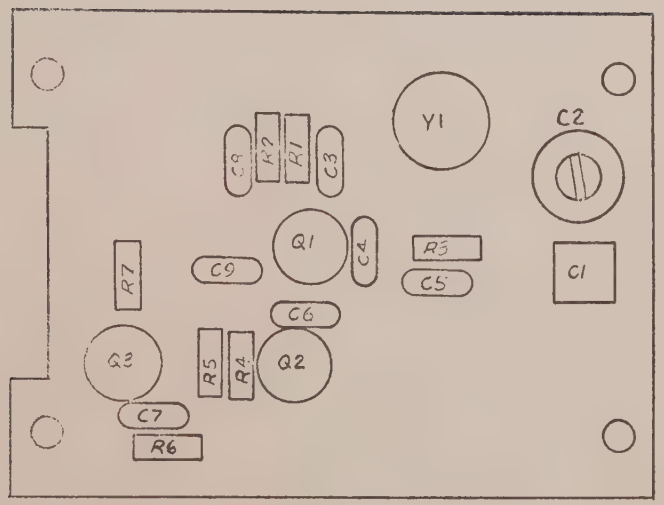
1.) RESISTORS ARE IN OHMS 1/8W 5%.
2.) CAPACITORS ARE IN MF.
3.) INDUCTORS MARKED ℓ ARE LOCATED ON PC BD.
4.) DIODES ARE 5082-2800

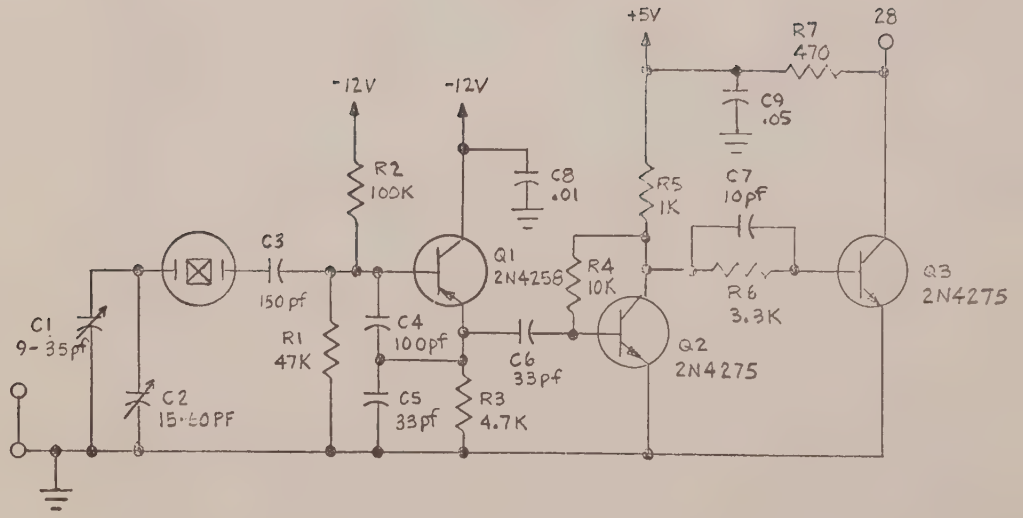
PRESCALER ASSEMBLY SCHEMATIC
DIAGRAM #7-05349901

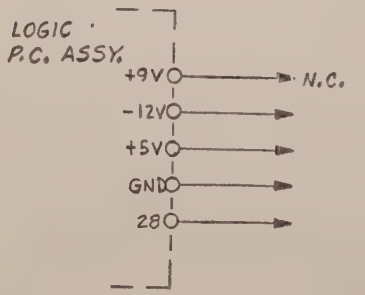




PRESCALER ASSEMBLY
#1-83839K02

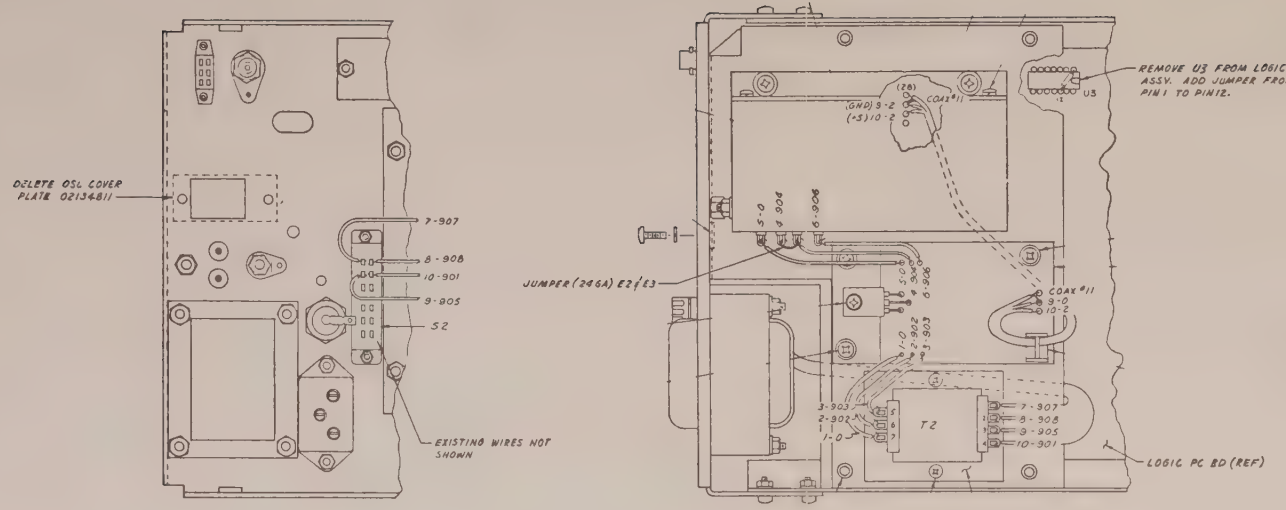






NOTES: UNLESS OTHERWISE SPECIFIED,
1. ALL RESISTORS 1/4 W, 5 %.
2. ALL CAPACITORS IN μf.

OSCILLATOR, ASSEMBLY AND SCHEMATIC
#1-83739K01



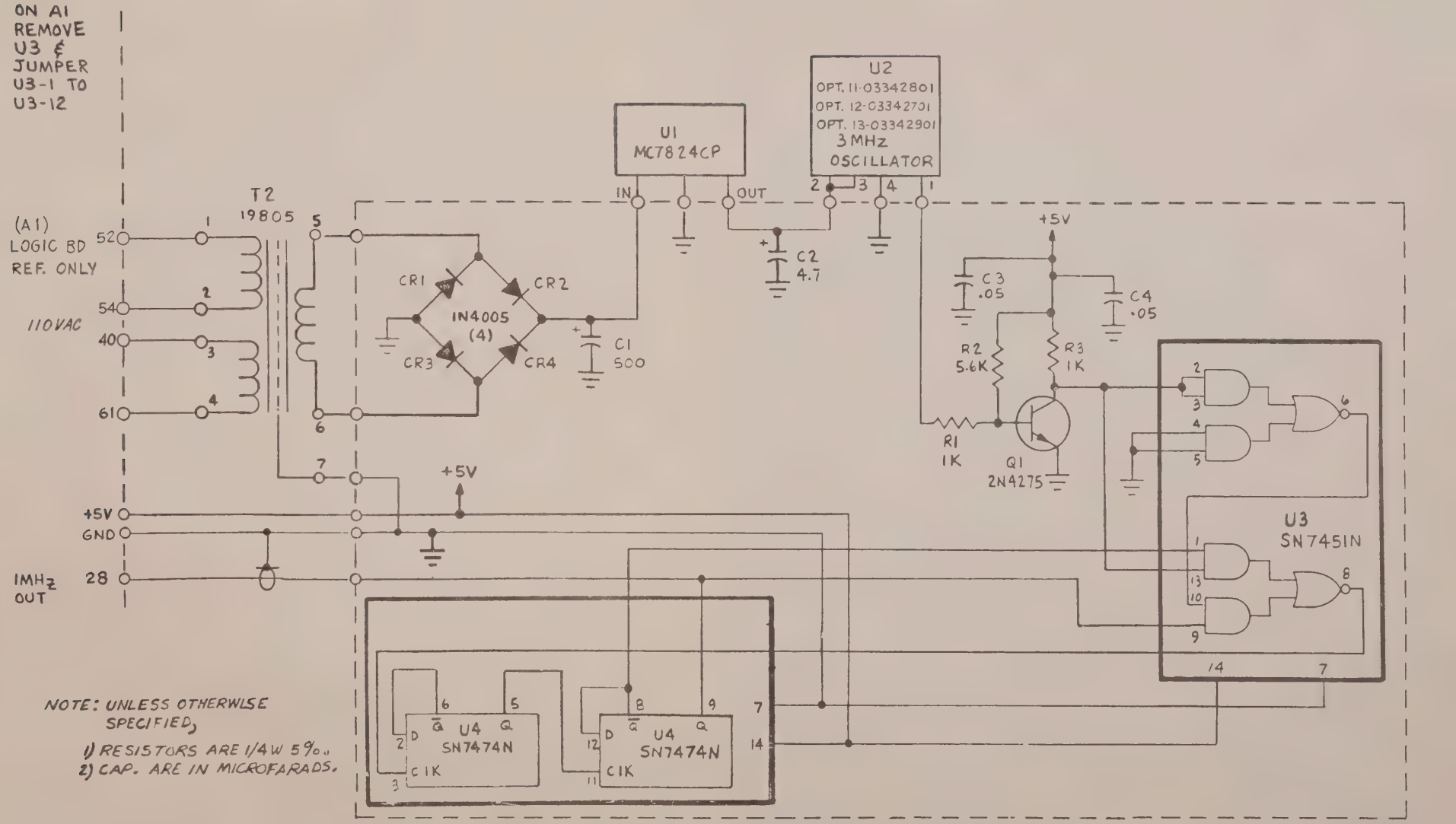
NOTES: UNLESS OTHERWISE SPECIFIED,

1. SOLDER WIRES TO LOGIC BOARD (A1) BEFORE MOUNTING OSC. CHASSIS
2. MODEL SLN6619A USES OSC. OPT. 12 ONLY.

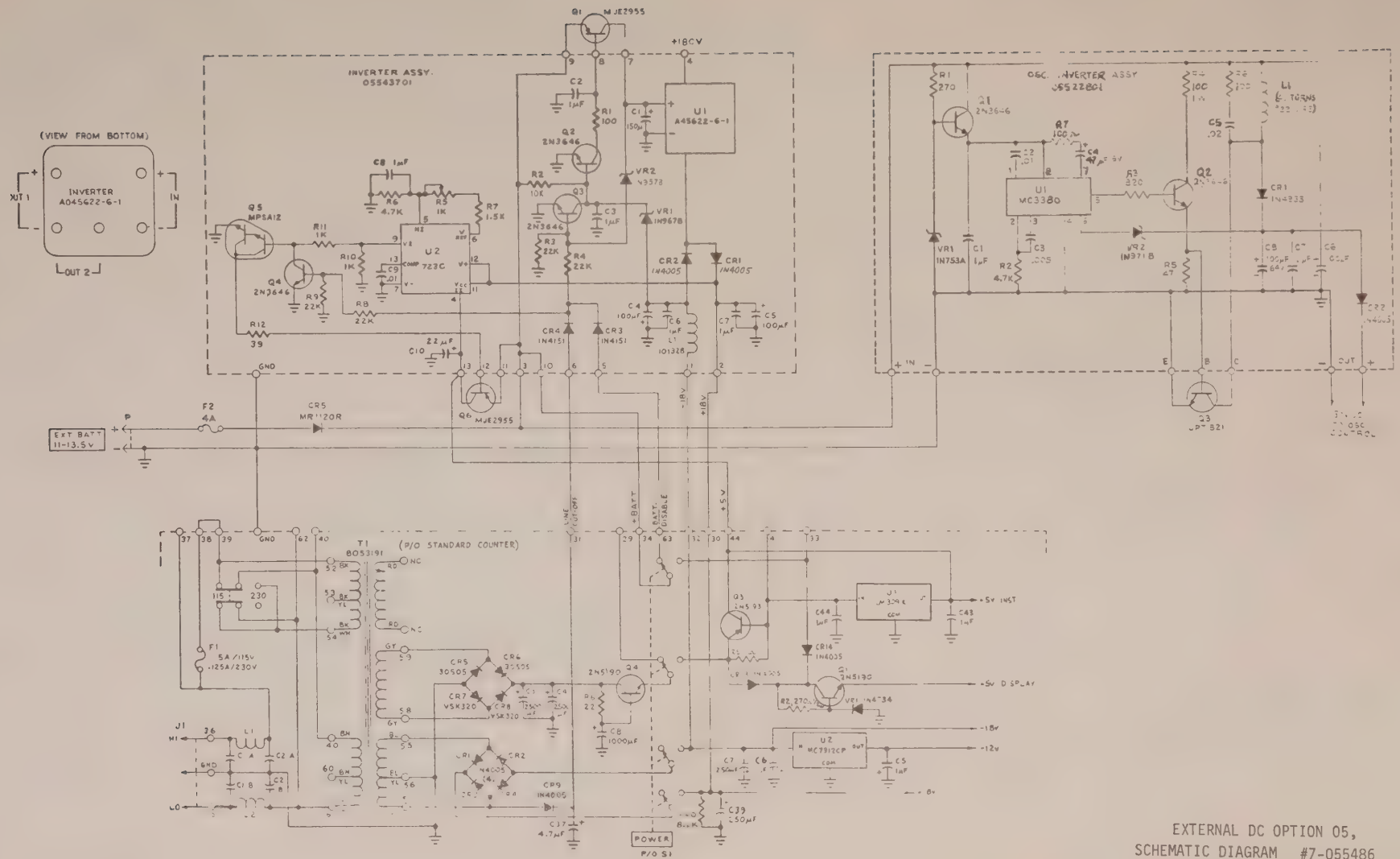
ITEM 19 OSCILLATOR TABULATION

OPTION	FINAL ASSY	OSC REF
11	05570201	03342801
SEE NOTE 2 * 12	05570202	03342701
13	05570203	03342901

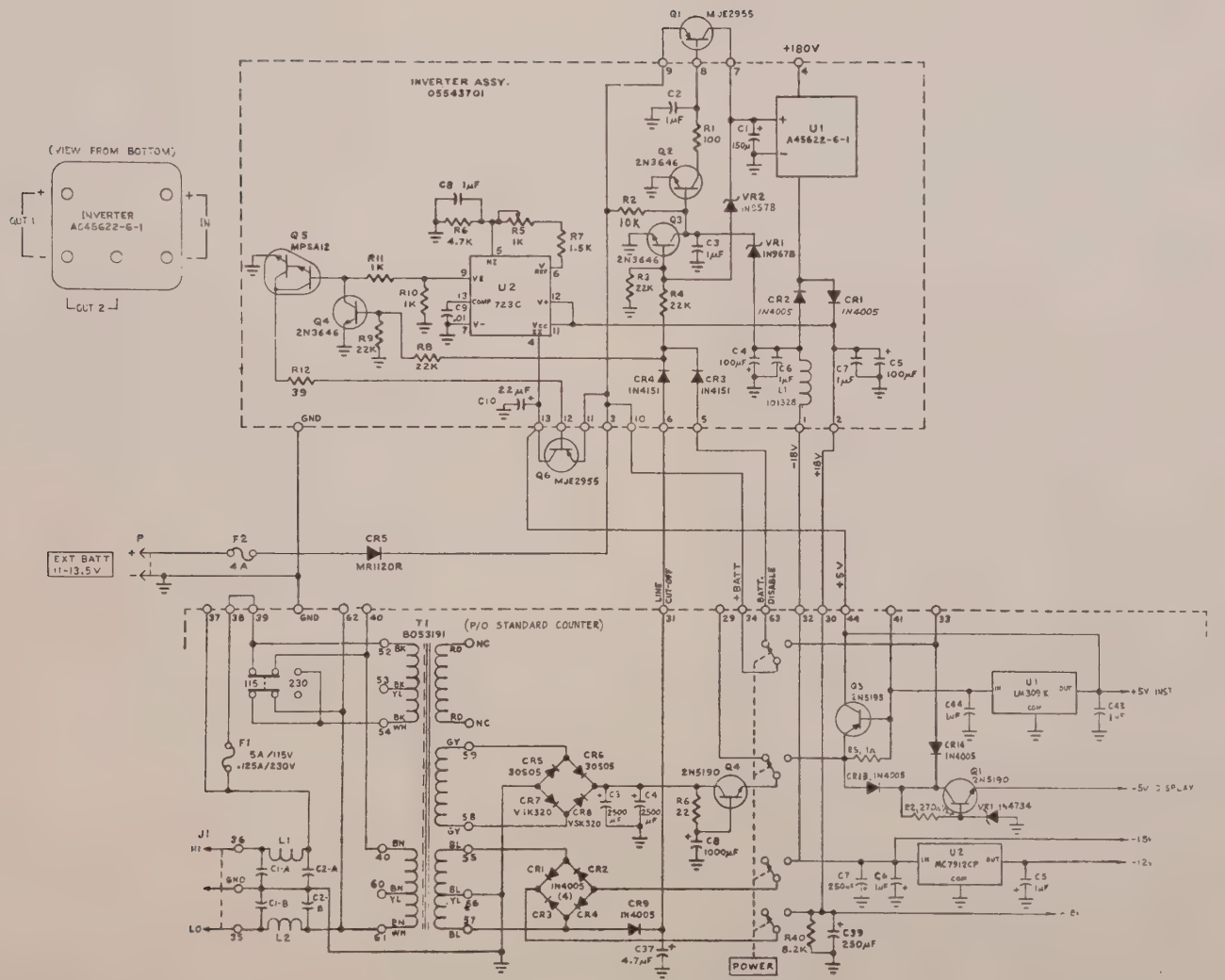
OSCILLATOR ASSEMBLY, OPTION 11, 12, 13
#1-83739K13



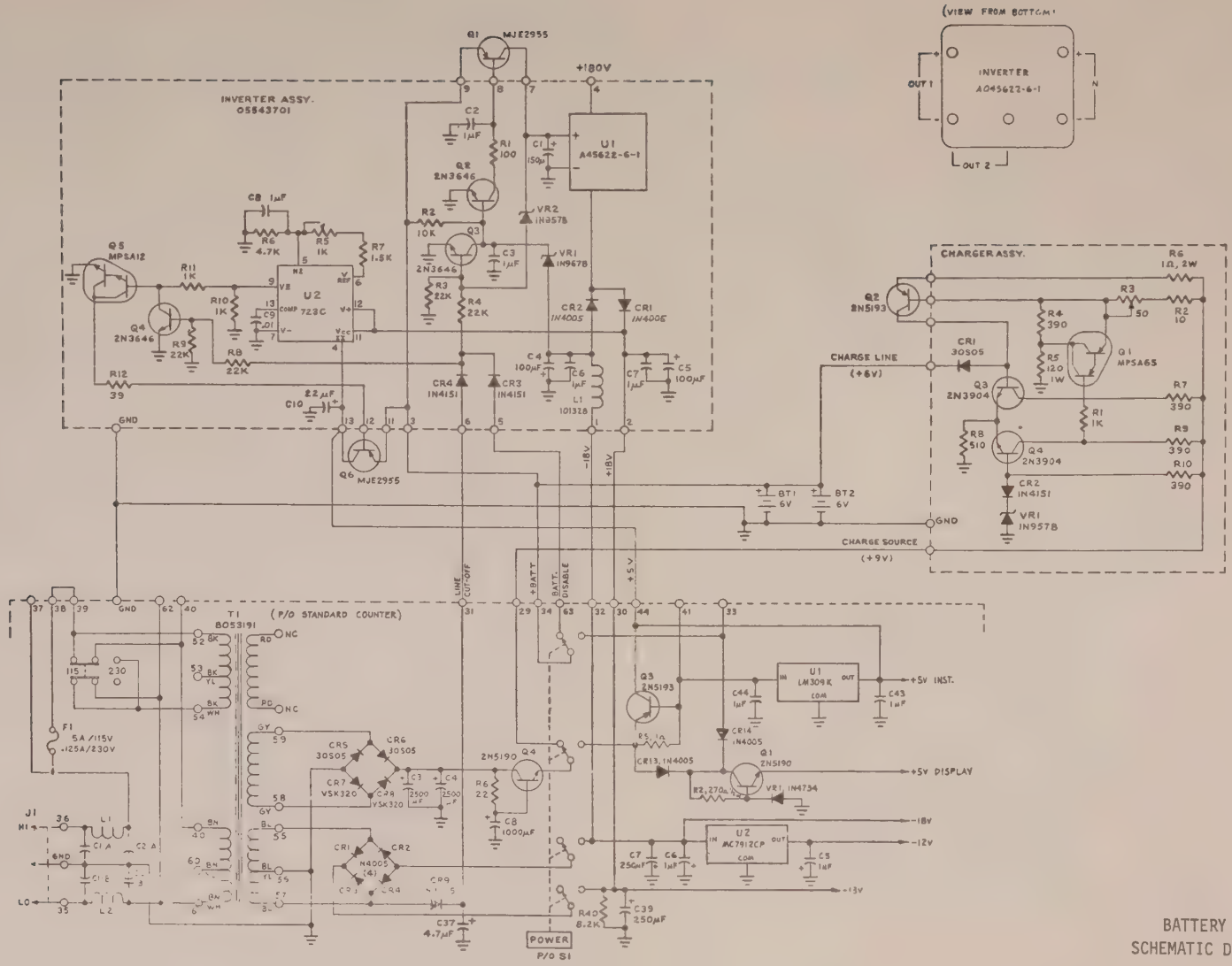
OSCILLATOR ASSEMBLY, OPTION 11, 12, 13
SCHEMATIC DIAGRAM # 7-055703



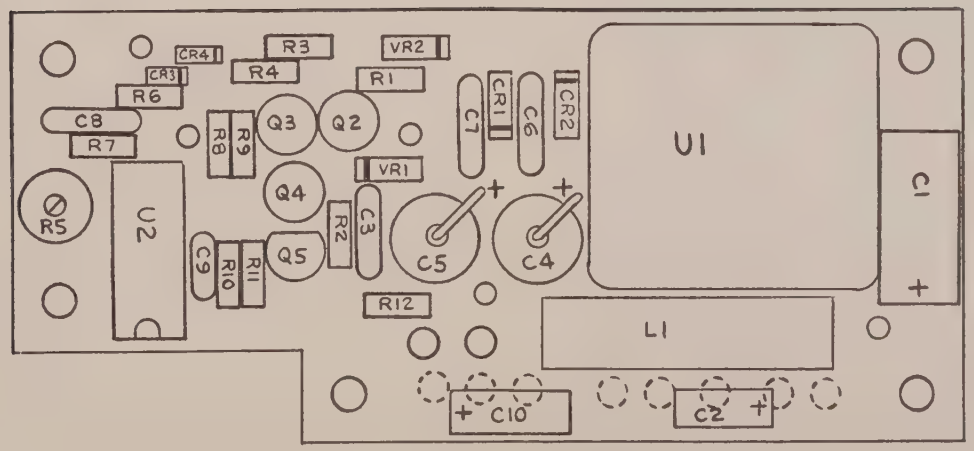
EXTERNAL DC OPTION 05,
SCHEMATIC DIAGRAM #7-055486



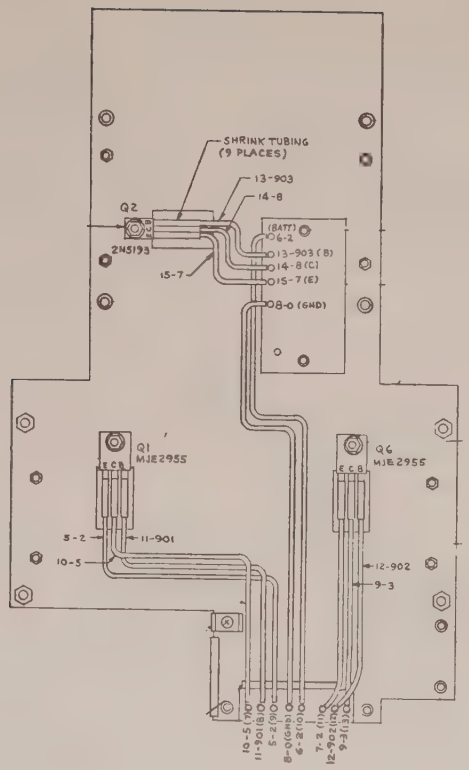
EXTERNAL DC OPTION 07,
SCHEMATIC DIAGRAM SLN-6422A

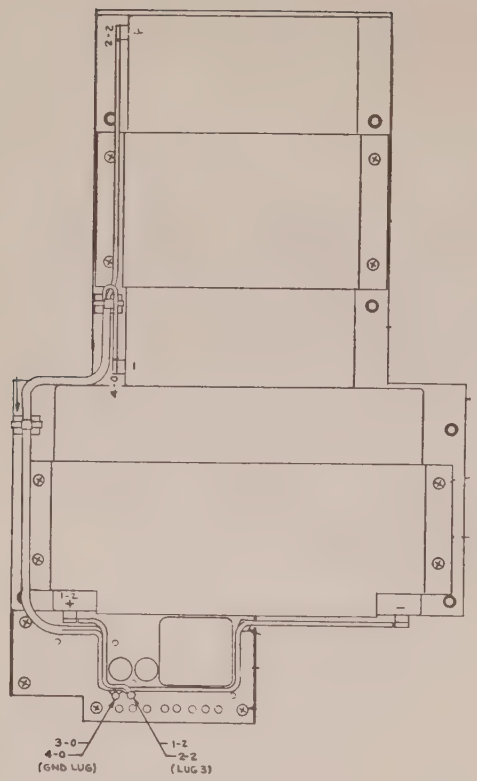


BATTERY PACK OPTION 06,
SCHEMATIC DIAGRAM SLN-6421A

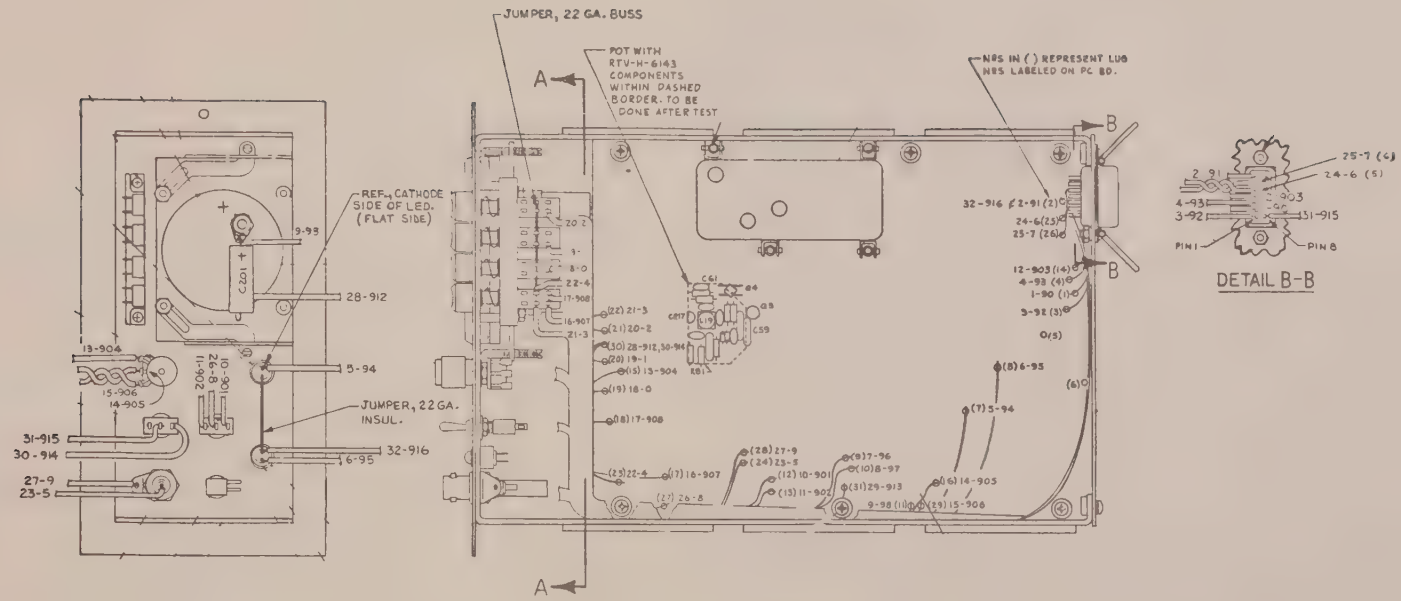


INVERTER ASSEMBLY
#1-82822K29

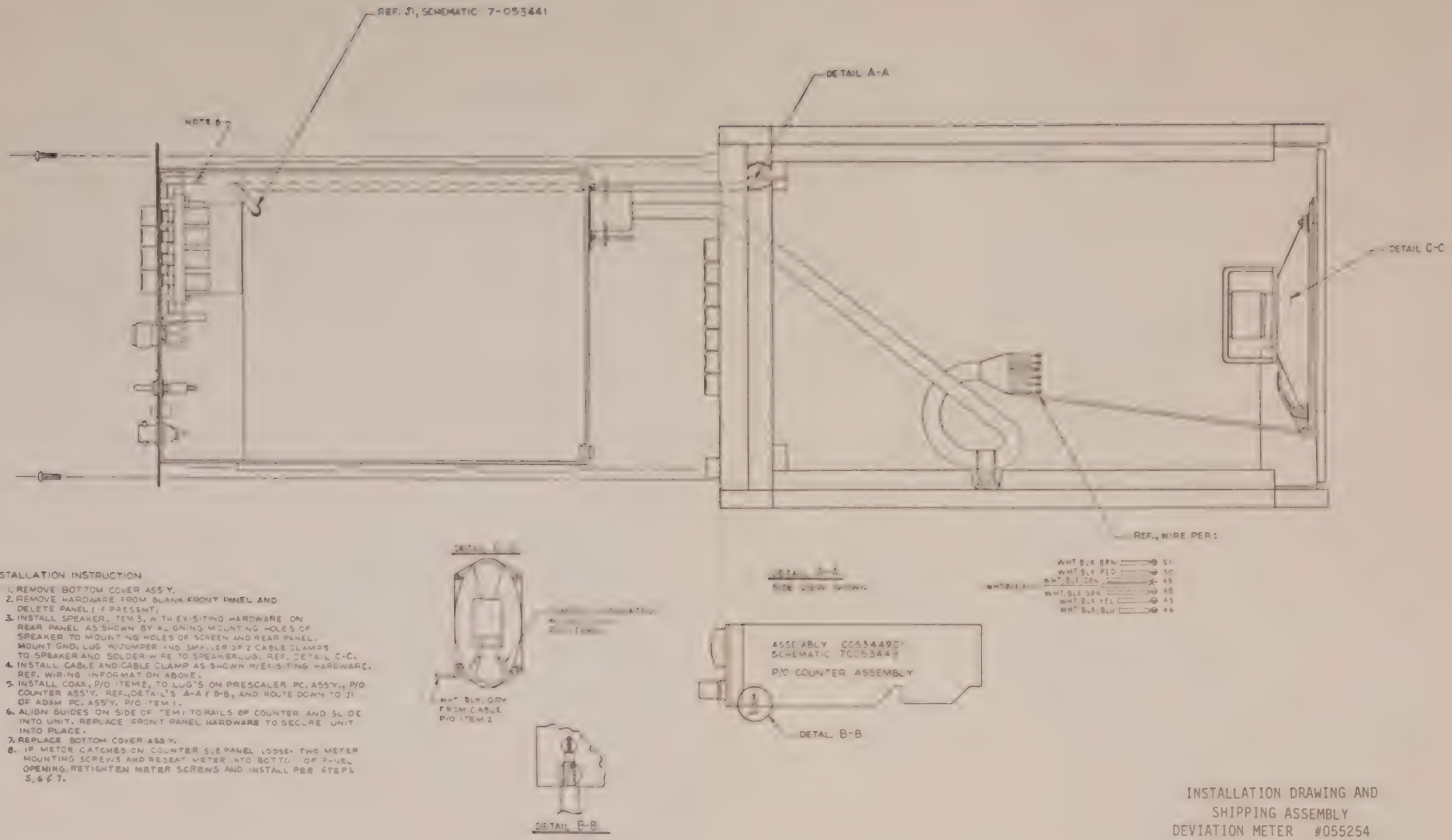




6-VOLT BATTERY PACK ASSEMBLY
#1-82822K33



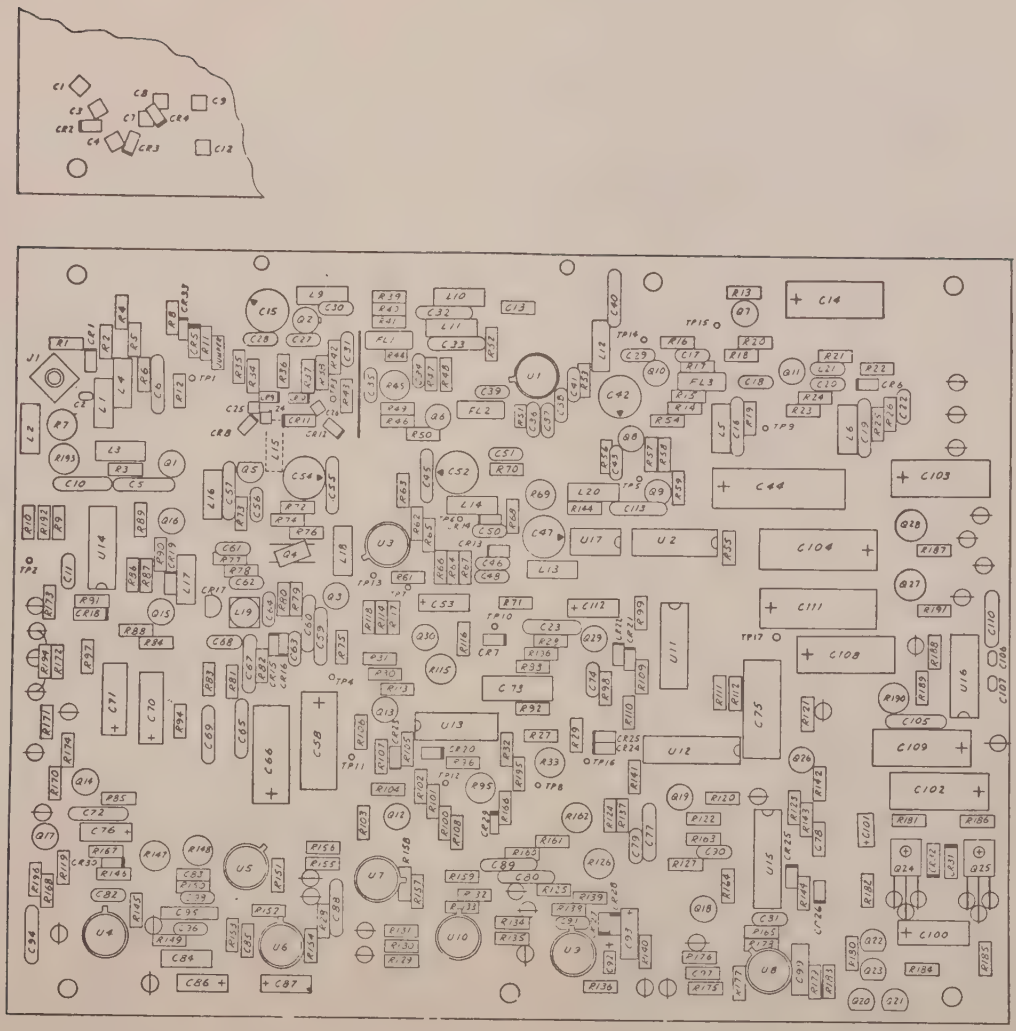
TEST ASSEMBLY, DEVIATION METER
SLN-6408A



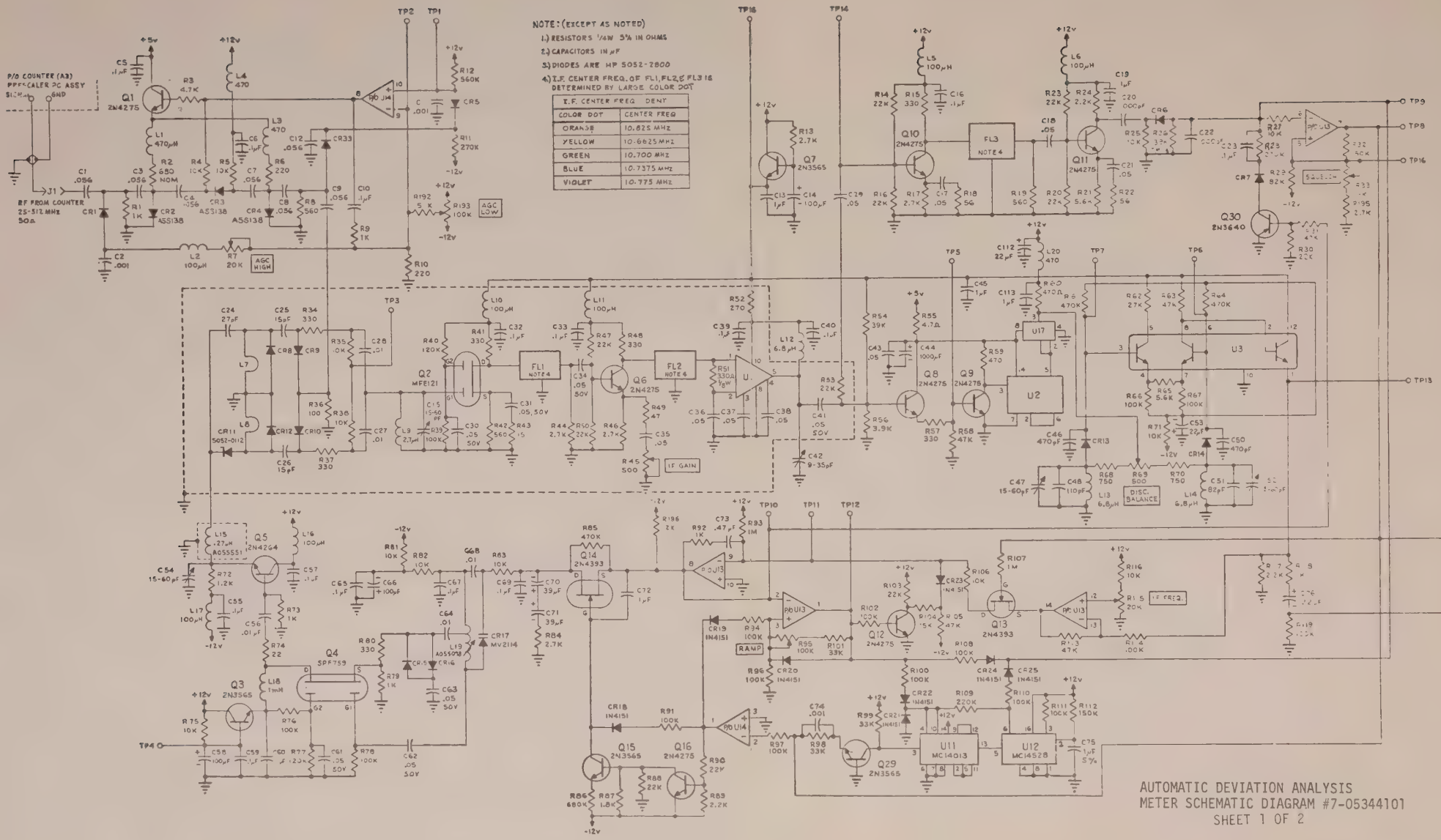
INSTALLATION INSTRUCTION

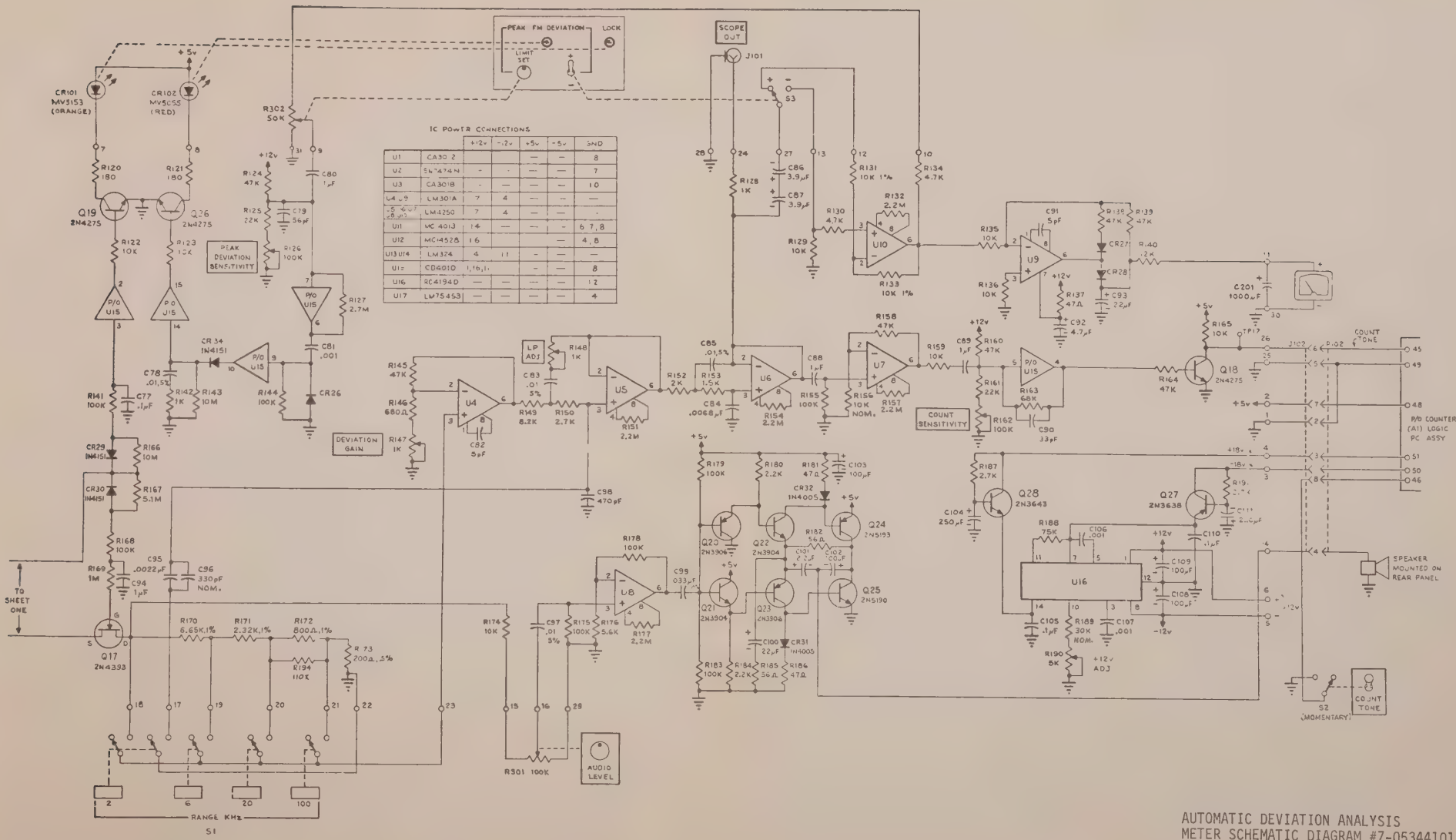
1. REMOVE BOTTOM COVER ASS'Y.
2. REMOVE HARDWARE FROM BLANK FRONT PANEL AND DELETE PANEL (IF PRESENT).
3. INSTALL SPEAKER, ITEM 3, WITH EXISITING HARDWARE ON REAR PANEL AS SHOWN BY ALIGNING MOUNTING HOLES OF SPEAKER TO MOUNTING HOLES OF SCREEN AND REAR PANEL. MOUNT GND. LUG W/JUMPER AND SMALLER OF 2 CABLE CLAMPS TO SPEAKER AND SOLDER WIRE TO SPEAKER LUG. REF. DETAIL C-C.
4. INSTALL CABLE AND CABLE CLAMP AS SHOWN W/EXISTING HARDWARE. REF. WIRING INFORMATION ABOVE.
5. INSTALL COAX, P/O ITEM 2, TO LUG'S ON PRESCALER PC. ASS'Y., P/O COUNTER ASS'Y. REF. DETAIL'S A-A & B-B, AND ROUTE DOWN TO J1 OF ADAM PC. ASS'Y. P/O ITEM 1.
6. ALIGN GUIDES ON SIDE OF ITEM 1 TO RAILS OF COUNTER AND SLIDE INTO UNIT. REPLACE FRONT PANEL HARDWARE TO SECURE UNIT INTO PLACE.
7. REPLACE BOTTOM COVER ASS'Y.
8. IF METER CATCHES ON COUNTER SUB PANEL LOOSEN TWO METER MOUNTING SCREWS AND RESEAT METER INTO BOTTOM OF PANEL OPENING. RETIGHTEN METER SCREWS AND INSTALL PER STEPS 5, 6 & 7.

INSTALLATION DRAWING AND
SHIPPING ASSEMBLY
DEVIATION METER #055254

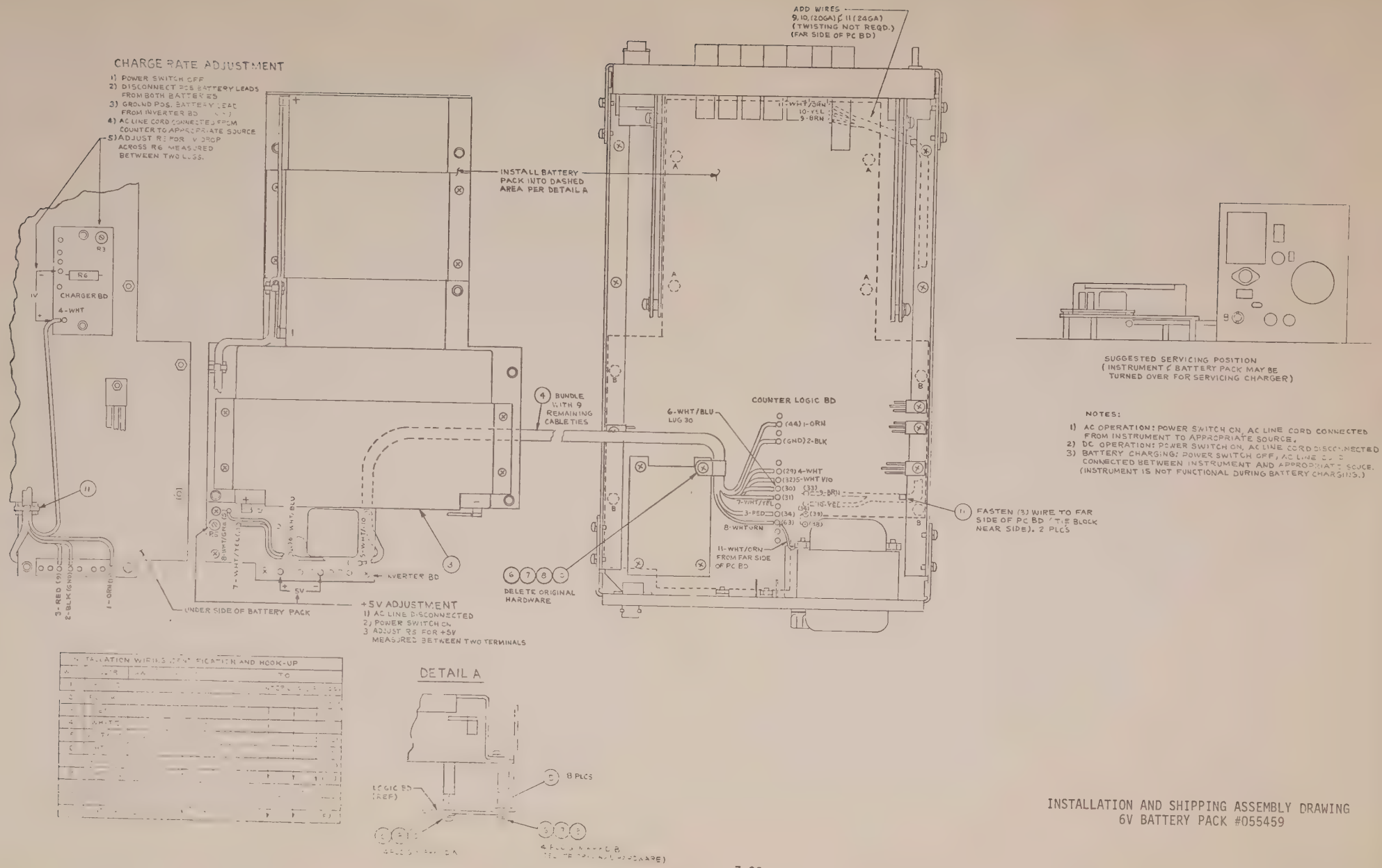


AUTOMATIC DEVIATION ANALYSIS
METER ASSEMBLY #1-83739K14

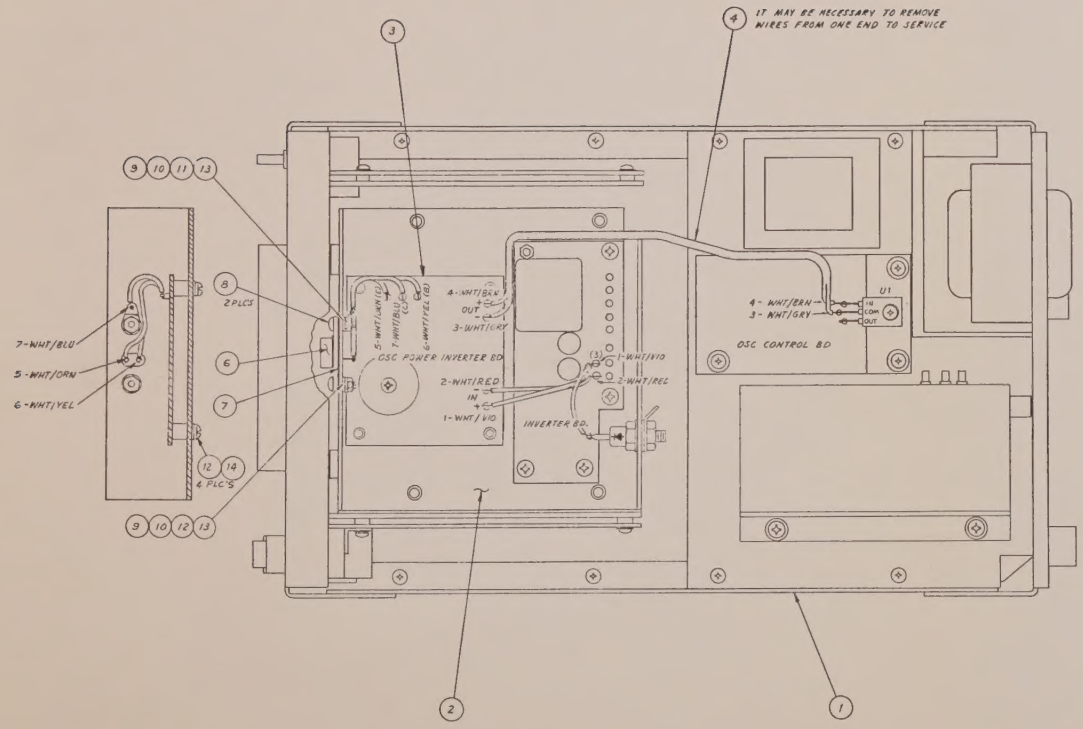

NOTE: (EXCEPT AS NOTED)
1.) RESISTORS 1/4W 5% IN OHMS
2.) CAPACITORS IN μF
3.) DIODES ARE HP 5082-2800
4.) I.F. CENTER FREQ. OF FL1, FL2, & FL3 IS DETERMINED BY LARGE COLOR DOT
I.F. CENTER FREQ DENT
COLOR DOT | CENTER FREQ
ORANGE | 10.825 MHz
YELLOW | 10.6625 MHz
GREEN | 10.700 MHz
BLUE | 10.7375 MHz
VIOLET | 10.775 MHz
P/O COUNTER (A3) PRESCALER PC ASSY
RF FROM COUNTER 25-512 MHz 50Ω
AGC HIGH
AGC LOW
IF GAIN
DISC. BALANCE
RAMP
IF FREQ.
TO SHEET TWO
AUTOMATIC DEVIATION ANALYSIS
METER SCHEMATIC DIAGRAM #7-05344101
SHEET 1 OF 2



AUTOMATIC DEVIATION ANALYSIS
METER SCHEMATIC DIAGRAM #7-05344101
(SHEET 2 OF 2)


CHARGE RATE ADJUSTMENT
1) POWER SWITCH OFF
2) DISCONNECT RED BATTERY LEADS FROM BOTH BATTERIES
3) GROUND RED BATTERY LEAD FROM INVERTER BD
4) AC LINE CORD CONNECTED FROM COUNTER TO APPROPRIATE SOURCE
5) ADJUST R5 FOR .1V DROP ACROSS R6 MEASURED BETWEEN TWO LUGS.
R3
R6
CHARGER BD
4-WHT
INSTALL BATTERY PACK INTO DASHED AREA PER DETAIL A
ADD WIRES 9,10,(20GA) & 11 (24GA) (TWISTING NOT REQD.) (FAR SIDE OF PC BD)
12-WHT/ORN
10-YEL
9-BRN
4 BUNDLE WITH 9 REMAINING CABLETIES
COUNTER LOGIC BD
6-WHT/BLU LUG 30
(44) 1-ORN
(GND) 2-BLK
(29) 4-WHT
(32) 5-WHT/VIO
(30)
(31)
7-WHT/YEL
3-RED
(34)
(63)
8-WHT/ORN
11-WHT/ORN FROM FAR SIDE OF PC BD
(33) 3-BRN
(28) 10-YEL
(29)
(18)
11 FASTEN (3) WIRE TO FAR SIDE OF PC BD (TIE BLOCK NEAR SIDE). 2 PLCS
3-RED (9)
2-BLK (GND)
1-ORN
UNDER SIDE OF BATTERY PACK
INVERTER BD
+5V ADJUSTMENT
1) AC LINE DISCONNECTED
2) POWER SWITCH ON
3) ADJUST R5 FOR +5V MEASURED BETWEEN TWO TERMINALS
DELETE ORIGINAL HARDWARE
SUGGESTED SERVICING POSITION
(INSTRUMENT & BATTERY PACK MAY BE TURNED OVER FOR SERVICING CHARGER)
NOTES:
1) AC OPERATION: POWER SWITCH ON, AC LINE CORD CONNECTED FROM INSTRUMENT TO APPROPRIATE SOURCE.
2) DC OPERATION: POWER SWITCH ON, AC LINE CORD DISCONNECTED
3) BATTERY CHARGING: POWER SWITCH OFF, AC LINE CORD CONNECTED BETWEEN INSTRUMENT AND APPROPRIATE SOURCE. (INSTRUMENT IS NOT FUNCTIONAL DURING BATTERY CHARGING.)
DETAIL A
8 PLCS
LOGIC BD (REF)

INSTALLATION AND SHIPPING ASSEMBLY DRAWING
6V BATTERY PACK #055459

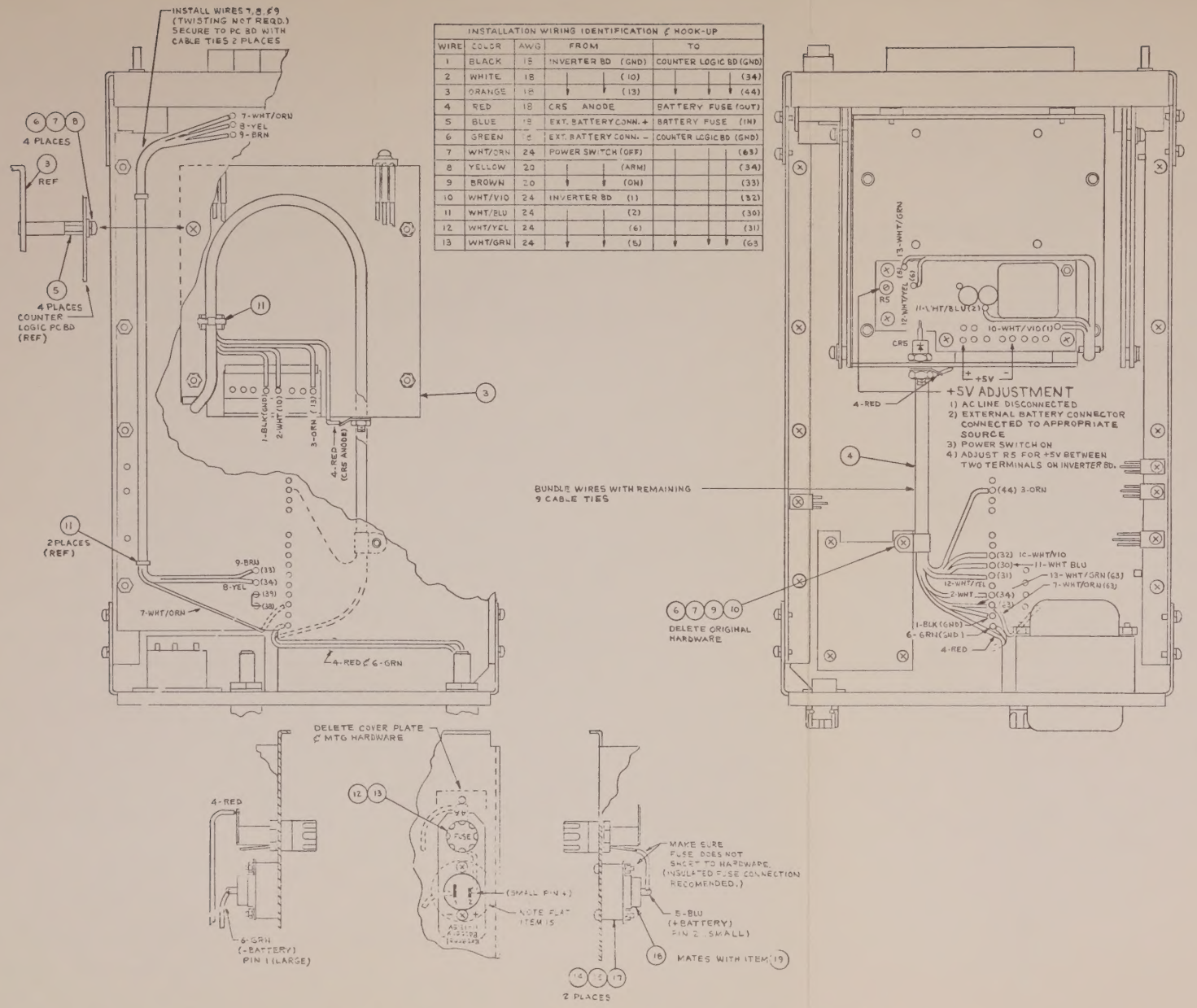


INSTALLATION WIRING IDENTIFICATION & HOOK-UP				
WIRE	COLOR	AWG	FROM	TO
1	WHT/VIO	22	OSC POWER INVERTER +(IN)	INVERTER BD (3)
2	WHT/RED	22	OSC POWER INVERTER GND	INVERTER BD GND
3	WHT/GRY	22	OSC POWER INVERTER GND	OSC CONTROL BD COM (U1)
4	WHT/BRN	22	OSC POWER INVERTER +(OUT)	OSC CONTROL BD IN (U1)
5	WHT/ORN	22	Q3 - E	OSC POWER INVERTER E
6	WHT/YEL	22	Q3 - B	OSC POWER INVERTER B
7	WHT/BLU	22	Q3 - C (SOLDER LUG)	OSC POWER INVERTER C

NOTES:

1. FOR EXTERNAL DC OPERATION:
   A) AC LINE CORD DISCONNECTED.
   B) EXTERNAL BATTERY CONNECTED TO APPROPRIATE DC SOURCE.
   C) POWER SWITCH ON.
2. AS LONG AS DC POWER IS APPLIED TO EXTERNAL BATTERY CONNECTOR, THE OSCILLATOR POWER INVERTER WILL OPERATE EVEN WHEN POWER SWITCH IS TURNED OFF.
3. FOR AC LINE OPERATION:
   A) AC LINE CONNECTED TO APPROPRIATE AC SOURCE.
   B) POWER SWITCH ON, INSTRUMENT OPERATES FROM AC SOURCE EVEN WHEN AN EXTERNAL DC SUPPLY IS APPLIED TO THE EXTERNAL BATTERY CONNECTOR

INSTALLATION AND SHIPPING ASSEMBLY DRAWING
EXTERNAL DC SUPPLY, OPTION 05 #055478



INSTALLATION WIRING IDENTIFICATION & HOOK-UP				
WIRE	COLOR	AWG	FROM	TO
1	BLACK	18	INVERTER BD (GND)	COUNTER LOGIC BD (GND)
2	WHITE	18	(10)	(34)
3	ORANGE	18	(13)	(44)
4	RED	18	CRS ANODE	BATTERY FUSE (OUT)
5	BLUE	18	EXT. BATTERY CONN. +	BATTERY FUSE (IN)
6	GREEN	18	EXT. BATTERY CONN. –	COUNTER LOGIC BD (GND)
7	WHT/ORN	24	POWER SWITCH (OFF)	(63)
8	YELLOW	20	(ARM)	(34)
9	BROWN	20	(ON)	(33)
10	WHT/VIO	24	INVERTER BD (1)	(32)
11	WHT/BLU	24	(2)	(30)
12	WHT/YEL	24	(6)	(31)
13	WHT/GRN	24	(5)	(63

NOTES:
1) FOR EXTERNAL DC OPERATION:
   A) AC LINE CORD DISCONNECTED
   B) EXTERNAL BATTERY CONNECTED TO APPROPRIATE DC SOURCE
   C) POWER SWITCH ON.
2) FOR AC LINE OPERATION:
   A) AC LINE CONNECTED TO APPROPRIATE AC SOURCE
   B) POWER SWITCH ON, INSTRUMENT OPERATES FROM AC SOURCE EVEN WHEN AN EXTERNAL DC SUPPLY IS APPLIED TO THE EXTERNAL BATTERY CONNECTOR.

INSTALLATION AND SHIPPING ASSEMBLY DRAWING
EXTERNAL DC SUPPLY, OPTION 07 #055475